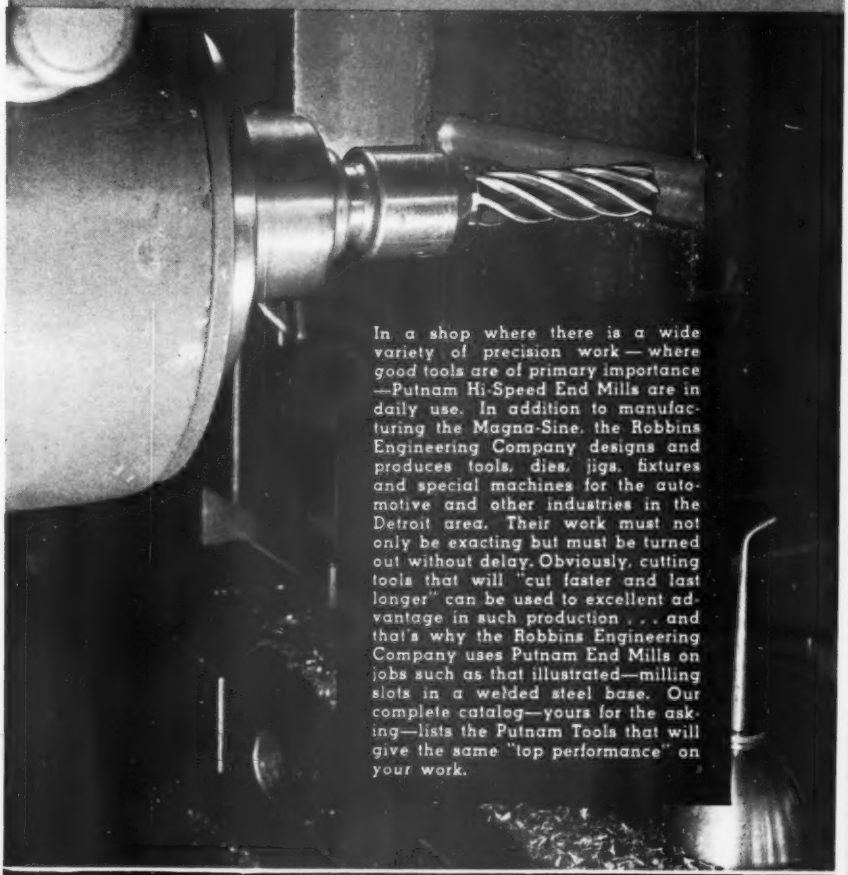
TOOL DIE MACHINE
PROGRESS
THE NATIONAL TOOL AND DIE JOURNAL

TOOLS, DIES, JIGS, FIXTURES, MOULDS, GAGES, MACHINES
Design and Engineering
PRECISION SPECIALTIES
STAMPING and PARTS PRODUCTION
Official Publication
Special Tool, Die & Machine Shop Industry

AUGUST
1939

Circulation more than 12,000

"Using Putnam End Mills, We Know We Can Depend On Top Performance"
ROBBINS ENGINEERING CO.—DETROIT



In a shop where there is a wide variety of precision work — where *good* tools are of primary importance —Putnam Hi-Speed End Mills are in daily use. In addition to manufacturing the Magna-Sine, the Robbins Engineering Company designs and produces tools, dies, jigs, fixtures and special machines for the automotive and other industries in the Detroit area. Their work must not only be exacting but must be turned out without delay. Obviously, cutting tools that will "cut faster and last longer" can be used to excellent advantage in such production . . . and that's why the Robbins Engineering Company uses Putnam End Mills on jobs such as that illustrated—milling slots in a welded steel base. Our complete catalog—yours for the asking—lists the Putnam Tools that will give the same "top performance" on your work.

PUTNAM TOOL COMPANY
2985 Charlevoix Avenue • Detroit, Michigan

When You Are Busy You Must Have Accurate Equipment Right at Hand —

The *Grindrite* die grinder is that kind. It is a notable time-saver in tool, die, machine and pattern shops for quick, accurate grinding of convex and concave surfaces, unusual and difficult-to-get-at shapes.

SPECIFICATIONS:

Height	Approx. 58 inches
Floor Space	Approx. 29″ x 33″
Weight	Approx. 600 lbs.
Motor:	1 HP—1750 RPM—220 or 440 V.
Grinding Wheels:	8″ dia. 3½″ face.

May we send you a catalog?

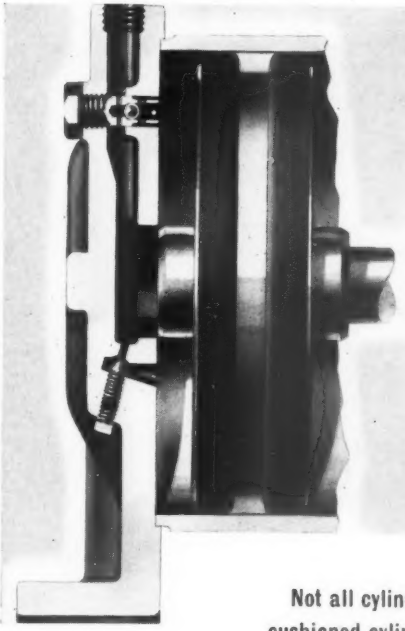
In production plants, the *Grindrite* is used by manufacturers of automobiles; car and truck bodies; automobile frames; parts and assemblies; railroad equipment; malleable and steel castings; metal stampings; toys and electrical equipment.

The new *Portable Model* can be taken right to the job and if there is parts-fitting to be done the new vise-equipped *Companion Work Bench* with its 6½ square feet of table surface can be right at hand.

KOESTLIN TOOL & DIE CORPORATION

3601 Humboldt Avenue **Detroit, Michigan**

Largest Independent Die Builder



If your Cylinder needs a Cushion
GET THE BEST

Not all cylinder applications are best met with a cushioned cylinder. Where a cushion, however, is essential, specify one with a positive cushioning which in addition is adjustable.

All model Hanna Cylinders may be equipped with adjustable pneumatic cushions at either end or both ends. Their low first cost recommends them for all manner of operations involving short or long movement.

HANNA ENGINEERING WORKS

1765 ELSTON AVENUE
CHICAGO, ILLINOIS

When you order or write about products described in TDM PROGRESS please mention the publication.

Copyright 1939 by George J. Huebner

TOOL DIE MACHINE PROGRESS
THE NATIONAL TOOL AND DIE JOURNAL

TOOL·DIE·MACHINE PROGRESS

The National Tool and Die Journal

—

Editor
George J. Huebner
Assistant Editor
Paul L. Reed

—

Official Organ of the Special Tool, Die and Machine Shop Institute

Vol. 5 **AUGUST, 1939** **No. 5**

CONTENTS

The Economical Production of Stampings in Limited Quantities—George J. Huebner 11
Machine Tool Show 14
Die Designing and Estimating (VIII)—George Dannes 15
The Hardness Testing of Die and Tool Steels—C. H. Wilson 20
The Machine and Tool Exhibition 23
Shop Kink
An Index Fixture for Milling Parallel Oil Grooves—Ronald Updike 26
Special Invitation for Tool and Die Shop Men to the Machine Tool Show —Wendell E. Whipp 45

Advertisers In This Issue

Acme Industrial Company 33
Ajax Steel & Forge Co. 36
Arlavox Mfg. Company 44
Armstrong-Blum Mfg. Co. .....Outside Back Cover
Barth Stamping & Machine Works 42
Bates, H. O. 46
Bissett Steel Company 44
Boyar-Schultz Corporation 27
Bunell Machine & Tool Company...35 and 42
The Carborundum Company 5
Cleveland Universal Jig Company 42
Columbia Tool Steel Co. 32
Continental Machines, Inc. 7
Danly Machine Specialties, Inc. 9
Darwin & Milner, Inc. .....22 and 39
Davis Tool & Engineering Company 42
Denning Manufacturing Company 43
Detroit Alloy Steel Co. 6
Detroit Stamping Company 46
Drive-All Manufacturing Co. 37
Enterprise Machine Parts Corp. 42
Forging and Casting Corporation .....Center Spread
Gallmeyer & Livingston Co. 32
Gear Specialties, Inc. 30
Gerstner Tool Chests 44
Grob Brothers 23
Hahn Manufacturing Company 43
Hamilton Tool Company .....43 and 45
Hanna Engineering Works 3
Hovis Screwlock Company 8
Industrial Machine Company 43
Kearney & Trecker Corporation 10
Knu-Vise Products Co. 34
Koestlin Tool & Die Corp. .....Inside Front Cover and 42
Lincoln Tool & Die Co. 42
Majestic Tool & Mfg. Co. 42
McKinney Tool & Manufacturing Co. 43
Modern Tool & Die Company 43
National Machine Tool Builders' Association 14
New Method Steel Stamps, Inc. 34
Nielsen Tool & Die Co. 44
Northeastern Engineering Company 42
Ohio Ball Bearing Co. 31
Ohio Tool Company 43
Paramount Tool Company 43
Phoenix Machine Company 43
Porter, Geo. H., Steel Treating Company .. 34
Progressive Tool & Cutter Co. 37
Putnam Tool Co. .....Front Cover
Robbins, Omer E., Company 42
Royal Oak Tool & Machine Company ... 42
Sal-Way Steel Treating, Inc. 46
Schraner, A. P., & Company 43
Sommer & Adams Co...Inside Back Cover & 43
Star Machine & Tool Company 43
Star Tool & Die Works 42
Tomkins-Johnson Co. 8
Tools & Gages, Inc. 43
Ulmer, J. C., Company 43
Variety Machine & Stamping Company ... 43
Walton Company 41
Wheelock, Lovejoy & Company, Inc. 41
Wilson Mechanical Instrument Co., Inc.... 29

TDM PROGRESS circulation affords the only complete primary coverage of the tool rooms, die and mold shops in the production industries and the contract builders of special tools, dies, machines and precision specialties.

GEORGE J. HUEBNER, *Publisher*, 2460 Fairmount Boulevard, Cleveland, Ohio
Advertising Representatives Macfarland & Heaton, 287 Fourth Avenue, New York, N. Y.

THERE'S SOMETHING ABOUT THIS WHEEL THAT PLEASES EVERYBODY

• No matter what you're looking for in a toolroom wheel, you'll find it in wheels made by Carborundum.

OPERATORS LIKE THEM because they cut faster with lighter pressure . . . with greater ease. It requires less effort to turn out fine finishes and close tolerances—perfect workmanship.

SUPERVISORS LIKE THEM because they always turn out smooth, accurate finishes. Their cool-cutting action does not affect the temper of fine steels. Every job is done right . . . and done on schedule.

MANAGEMENT LIKES THEM because in the last analysis their fast-cutting action . . . the fine work they produce . . . the reduced machine maintenance they make possible . . . all these things add up to lower costs and increased profits.

Why not enjoy these same benefits in your own shop? There is an Aloxite Brand Aluminum Oxide toolroom grinding wheel for every condition and requirement . . . a wheel that will get better results and save you money. Send for Toolroom Wheel Grading Book today.

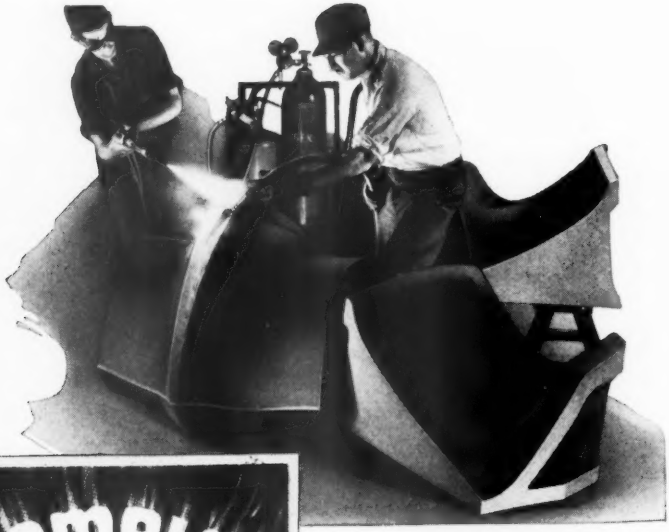
CARBORUNDUM
ABRASIVE PRODUCTS

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.
REG. U. S. PAT. OFF.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of The Carborundum Company)

When you order or write about products described in TDM PROGRESS please mention the publication.



FLAMALOY
FLAME HARDENING STEEL

ONE Simple, Easy, HARDENING OPERATION

JUST heat with a torch, and water quench, all in one easy operation—that's the way most of our customers harden our Flamaloy for an approximate 600 to 620 Brinell. Machining and spotting-in are done while the steel is still in the annealed state.

A thoroughly practical electric furnace, flame-hardening steel, our Flamaloy castings are extensively used where low cost and high wear-resistance are requisites. We would appreciate an opportunity to talk with you about Flamaloy, and our five other air-hardening and oil-hardening alloy and special tool steels, cast-to-shape.

DETROIT ALLOY STEEL COMPANY

Foot of Iron Street A E S Detroit, Michigan

Also Manufacturers of

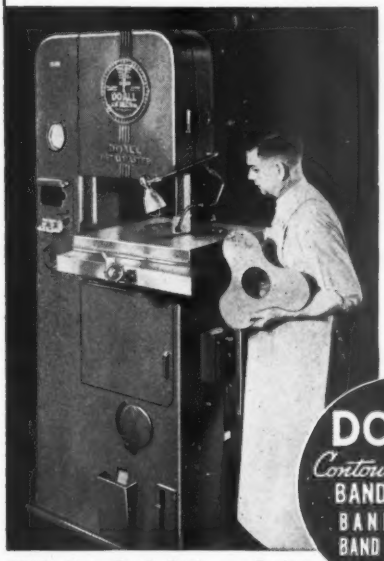
KROKOLOY · CASTALOY · MARTIN STEEL · CARBOMANG · CHROME MOLYBDENUM STEEL

When you order or write about products described in TDM PROGRESS please mention the publication.

DoAll SAVED 77 HOURS

Argus Engineering Company, Hartford, Conn., Manufacturers of dies, jigs and fixtures, made this clock shell part in 13 hours on the DoAll. Formerly it was drilled, broached and filed, requiring 90 hours.

RECORD SMASHING!



Contour Sawing, the new DoAll method of machining, is recognized as the fastest precision method of removing metal. Cuts out internal and external shapes from any metal up to 10" thick. Indispensable in up-to-date die making plants, where time and labor costs are always under close scrutiny.

Used in 23 countries by such firms as Ford, Fisher Body, Cadillac, Baldwin Locomotive, Douglas Aircraft, U. S. Navy, International Harvester, General Electric, Westinghouse, Ace Tool & Die, Glenn L. Martin, etc.

DO-ALL Contour Machine
BAND SAWING
BAND FILING
BAND POLISHING

Let a factory-trained man bring a DoAll to your plant and show you what it does, what it saves on your own work.

FREE New Hand Book on Contour Machining—100 pages of valuable metal working helps.

TDM-8

☐ Send data on the DoAll.

☐ Send Free Hand Book.

CONTINENTAL MACHINES, INC.

1303 S. Washington Ave. Minneapolis, Minn.

Name .....

Address .....

When you order or write about products described in TDM PROGRESS please mention the publication.

T-J DIE-SINKING MILLING CUTTERS

are sturdy. They hold a sharp edge longer, cut easier, carry less breakage percentage *and do more work between grinds!*

Send for *our new catalog number 139*, showing sizes and prices on our standard cutters.

THE TOMKINS-JOHNSON CO.

630 N. Mechanic St. Jackson, Michigan

72% SAVED

on 4 HOVIS Retainers

A die required 4 small individual punch retainers. One type had to be specially made and cost $9.00 each—$36.00.

But Hovis Standards were a perfect fit @ $2.50 each—$10.00.

Saving $26.00 or 72%.

We are doing that right along. Why not let us figure with you?

Easiest to install, quickest to change, longest to wear.

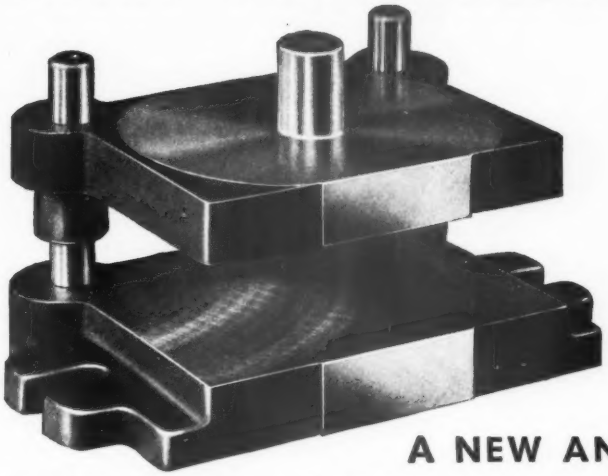
Send for NEW catalog

HOVIS SCREWLOCK CO.

3129 Larned Street East -:- Detroit, Michigan

When you order or write about products described in TDM PROGRESS please mention the publication.

DANLY *Announces*



A NEW AND ENLARGED LINE OF PRECISION DIE SETS

Danly Precision Guide Posts are ground, and lapped to plus or minus .0001" of listed dia. Precision Bushings are ground and honed to plus or minus .0001" of listed dia.

•

To meet the rapidly growing needs of the stamping industry, Danly Precision Die Sets are now available in a complete range of sizes of standard, back post sets for any die from 3"x3" to 16"x25".

Especially useful are a new square series, in sizes from 3"x3" to 14"x14".

The regular standard line has also been expanded, many new sizes added, and the line extended in the larger sizes.

If you have not received a copy of the new Danly Catalog, 10th Edition, which we believe is the most useful, easily used catalog in the industry, write for your copy.

Here you will find everything you need in standard die sets for the complete range of die requirements—and remember each size is stocked in each of the 8 Danly Branches for immediate delivery.

DIE BUYERS—Specify Danly Die Sets for Your Dies

DANLY MACHINE SPECIALTIES, Inc.
2121 So. 52nd Ave., Chicago, Ill.

DIE MAKERS—Include Danly Die Sets in Your Estimates

It will be good business for you both

DANLY DIE SETS and DIE MAKERS' SUPPLIES

Their Dependable Quality Means Lower Cost Stampings

9

When you order or write about products described in TDM PROGRESS please mention the publication.

American air-craft builders lead the world in standards of dependability, and accuracy. Milwaukee milling machines are an important production tool of "the industry that flies."

Write for bulletin 42-T

MODEL K
UNIVERSAL

KEARNEY & TRECKER CORPORATION
WEST ALLIS STATION MILWAUKEE, WISCONSIN

MORE THAN 41 years OF DOING ONE THING WELL

K&T

Milwaukee **MILLING MACHINES**

Tool • Die • Machine **PROGRESS**

The National Tool and Die Journal

August, 1939 **Vol. 5, No. 5**

The Economical Production of Stampings in Limited Quantities

A New Method, Multiple Contour-Machining Described

By George J. Huebner, Editor

[This article is written expressly in response to frequent recent requests from readers. Experienced executives and engineers have been consulted and the article may be considered a composite of their viewpoints as to the various methods and equipment described. We are unusually pleased to be able to point out that not one of those consulted considered his process an all-inclusive one nor insisted that his is an "all-purpose" product or machine. As circumstances alter cases so each has its place.

The Author.]

THE outstanding example of mass production is undoubtedly the automobile industry. It is remarkable not alone from the standpoint of the large number of finished units which are built and sold every year but likewise of the extraordinarily large number of individual pieces which make up parts assemblies and finally the completed car. In spite of having a product as expensive as it is, the automobile industry has built itself into top position as an industrial producer and largely by bringing out new models annually which have new eye-catching body lines and improved mechanical features. The discredited idea that the public will continue to buy year after year a product which is not improved mechanically or whose design does not embody the modern mode has frequently cost a manufacturer his loss of prestige, then sales and profits. On every hand today one sees products whose manufacturers have recognized this appeal which new contours and smoother operating mechanisms can have for buyers, and instances abound where the redesigning of a product to make it more attractive to the eye has "reactivated" the demand for it.

The new tooling which is required for bringing out new models and new products has expanded tool and die making facilities and has contributed very largely to the increased activities of Contract Tool, Die and Mold Shops. Machine tool and equipment manufacturers have increased speeds and feeds on tool and die making equipment and for some kinds of work there are entirely new, faster and less expensive techniques.

Tooling costs must invariably be absorbed in the manufacturing process regardless of whether quantities are large or small. When stamping "runs" reach hundreds of thousands and even millions of pieces, as they do in the automobile and a few other industries, the die cost,

as an example, is usually overcome quite readily.

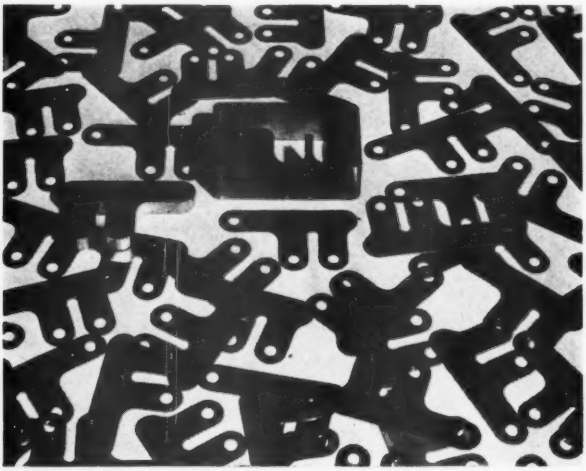


Fig. 1

A group of electric switch parts produced by sawing in multiple. Fifty identical parts were made simultaneously from power press stamping scrap.

By far the majority of products do not reach such impressive outputs however; in fact it is estimated that more than 75% of them are produced in quantities of less than 10,000. It is with such as these that we are concerned in this article, the so-called "short runs".

Short runs vary in the minds of manufacturers—one may think of 10,000 as a short run, whereas another's require-

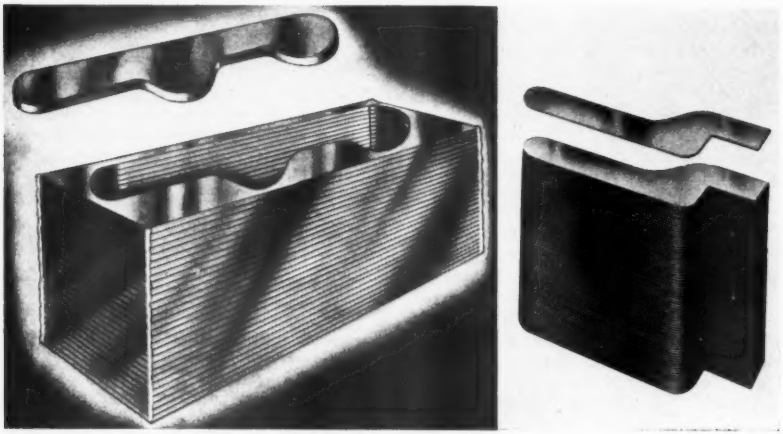


Fig. 2—Left—Adjusting levers for a special circuit-breaker, made of ⅛" C.R. steel were sawed out 29 parts at one time. The sheets were placed in an arbor press and their corners tack-welded to produce a solid prism of steel. The sawing time was just short of two hours, about 4 minutes for each piece.
Fig. 3—Right—Folding arms for an automatic packaging machine, of .083" H.C. steel. Seventy-five sheets were cut simultaneously. Labor cost per part was about three cents.

ments may be only 50 or 100. It is not possible to lay down hard and fast rules for procedure which will prove economical for the two extremes and for intervening quantities. As an example, there are plant managers and executives who offer convincing evidence that it pays to design and build a standard type

Fig. 4

Scrap sheets, both of uniform and of varying sizes, can quickly be placed in an arbor press and arc-welded. Then the layout line is scribed on the top sheet and the job is ready for the contour sawing.

precision die to turn out as few as 1,000 pieces in one run. This, however, is usually when orders for such quantities recur at intervals. One such plant which the writer has in mind makes as many as 30 press set-ups a day and finds it economical to use dies assembled in precision die sets. True there is a greater investment but such a die requires less time for the set-up, and press time is valuable. From a dollars and cents standpoint, therefore, the die cost is to a large extent justified by the time saved in setting up the press.

The Continental Process

A metal stamping process which has been employed for a number of years for small lot production is the Continental process. Dies are used but they are made of very thin sections of steel; they are not mounted and a "floating" punch is used. This technique involved the development of a patented mechanical shuttle which moves the die in and out with speed and safety. Primarily this process is efficient for quantities that do not exceed 10,000 pieces. It permits the use of stampings in place of castings in many instances where the sales of a complete product are not large. This process of course utilizes the standard power press.

The Guerin Process

The Guerin process is a comparatively recent development for producing small quantities of stamped parts. It was described at some length in the June issue of *Tool·Die·Machine PROGRESS. It is frequently not realized that an airplane requires thousands of intricate metal stampings. A Douglas Transport has 3,000 Duralumin parts from .003"

(Continued on page 29)

**For complete article see "The Utilization of Rubber in the Fabrication of Plane Stampings", page 9.*

Announcing the 1939

MACHINE TOOL SHOW

THE GREATEST EXHIBIT OF THE TOOLS

OF INDUSTRY EVER PRESENTED

Cleveland

OCTOBER 4-13, 1939

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

10525 CARNEGIE AVENUE, CLEVELAND, OHIO

YOUR SMARTEST INVESTMENT TODAY... MODERN MACHINE TOOLS

EXHIBITS

The 195 exhibits, occupying 150,000 square feet of floor space, will display nearly 1,000 machines. These will include every type of modern machine tool, and in full operation . . also many types of allied equipment and accessories. Every facility will be afforded for careful, thorough inspection.

ATTENDANCE

Attendance will be limited to qualified visitors. Admission to the Machine Tool Show will be by registration only. Among those attending will be officers and directors of manufacturing companies, operating executives, engineers, production men, buyers. More than 50,000 people visited the 1935 show.

Die Designing and Estimating

Advanced Series

VIII

By GEORGE DANNES

George Dannes is superintendent and engineer of the Permoflux Corporation of Chicago, and instructor in the advanced class studying Die Designing and Estimating at the Carl Schurz High School under the auspices of the Chicago District of the Special Tool, Die and Machine Shop Institute.

When studying the tables and applying the time values which have been developed in the Dannes method of die estimating it should be remembered always that they are based upon die making procedure in an average tool room or die shop with average equipment and workers of average skill. The time values represent not only the actual machine and hand operations but they take into consideration, also, time losses which experience has proven are usually encountered.

Some shops, however, are better equipped than average, some have more efficient workers, in others time losses are being reduced by efficiency studies. Executives in such organizations should be able to determine from their cost records the percentage of improvement which they are able to demonstrate over these *average* time values. Also, these tables should provide for superintendents and foremen the standards to be striven for or improved upon.

We have had many interesting comments upon this series of articles and we always appreciate such comments from our readers.—The Editor.

ESTIMATING TIME FOR WORK ON ACCESSORIES—DIE GROUP E

GROUP E consists of all the accessories and miscellaneous parts which are necessary to complete the die and assure its proper functioning. Such items are gages, stops, nests, locating pins, spring pins, knockouts and pressure controls and their time values are to be entered on the estimating form in column E. The values determined for perforators, pilots, their corresponding holes and die bushings are also recorded in this column although it may seem that these items are misplaced and that they should be listed in column D because they are not accessories but actual parts of the die itself. The reason they are placed in column E is simply to prevent the overcrowding of column D and to help the estimator to concentrate on the more time-consuming operations such as die openings, punches, etc.

Since in most shops perforators are more or less of standard design and in some they are turned out or bought in quantities and kept in stock until needed, they do, after all, come very close to being accessories.

In Fig. 21 are illustrated four types of perforators such as are commonly used in die shops. Types 1 and 2 are

Types of Perforators in Common Use

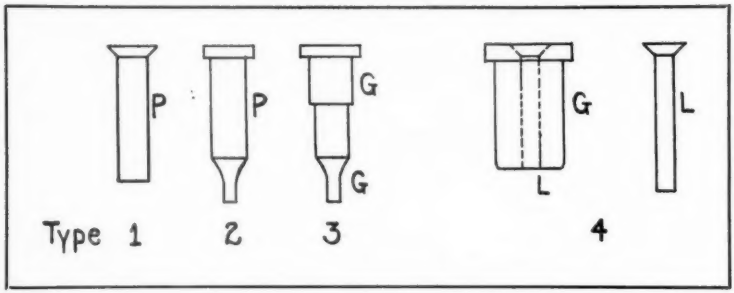


Fig. 21

generally used for production runs not exceeding 50,000 pieces when stock not exceeding a thickness of $\frac{1}{16}$" is used. For heavier materials and longer runs type 2 *only* should be used because it withstands more severe impacts, will not "dig" into the punch holder as readily nor pull out of the punch pad as type 1 sometimes will when stripping comparatively heavy stock (over $\frac{1}{16}$" thick).

Type 3 should be used when extreme accuracy is required. Its entire body—shank and working end—is ground after hardening, thus assuring perfect alignment. It is needless to point out that this type of perforator requires considerably more time to make than either type 1 or 2.

Type 4 is the quill type perforator, generally used where a very small perforator is required and quick replacement is necessary. Time consumption for making this type of perforator is necessarily higher because it includes the making of both the quill and the perforator, both of which have to be ground and lapped if satisfactory results are to be attained.

Note in Fig. 21 that each type of perforator is marked with a letter indicating the machine operations it had to undergo, thus: P—polished; G—ground and L—lapped.

Fig. 22 is a table of time values for making these four types of perforators and finishing them according to the requirement in each instance—polished, ground or lapped. Pilots are classed with perforators and the same time values apply.

The making of die bushings and guide bushings requires about the same time as does a type 3 perforator and again table 22 is used.

In Fig. 23 are presented the time values for finishing perforator holes.

Time Values for Making and Finishing Perforators and Pilots

TYPE	1	2	5 OR MORE
1 UP TO $\frac{1}{4}$"	.7	.5	.4
2 " " $\frac{5}{8}$"	.9	.7	.6
2 OVER $\frac{5}{8}$"	1.2	.9	.7
3 UP TO $\frac{5}{8}$"	2.0	1.5	1.0
3 OVER $\frac{5}{8}$"	2.5	2.0	1.4
4 $\frac{1}{8}$" DIA.	3.0	2.5	2.0
4 $\frac{1}{4}$" "	4.0	3.0	2.5
4 $\frac{1}{2}$" "	5.0	4.0	3.0

Time in hours.

Fig. 22

Time Values for Finishing Perforator Holes

SIZE	Tolerance	Blanking Die	Compound Die*
$\frac{1}{8}$ TO 1"	± .0015	.9	1.3
$\frac{1}{8}$ TO 1"	± .001	1.7	2.5
$\frac{1}{16}$ TO $\frac{1}{8}$"	$\frac{1}{2}$" Deep	.8	1.0
No. 60 TO $\frac{1}{16}$"	$\frac{1}{2}$" Deep	1.1	1.9

Values include holes in die, punch plate, stripper and die shoe.

* Also includes shedders as required.

Fig. 23

These are *combined* time values for drilling and finishing perforator holes in die, punch plate and die shoe. The column for compound dies also includes time values for shedders as required. These time values are based upon (1) the diameter of the hole; (2) the tolerance which is allowed. Holes less than ⅛" diameter are indicated to be drilled only ½" deep as a maximum because of the difficulty in maintaining accuracy with such a small drill and also to avoid drill breakage. These small diameter holes should be relieved from the back of the die with a larger slug clearance hole.

Fig. 24 is the table of time values for drilling holes intended for holding pilots in position and they include likewise the clearance holes in die blocks, in progressive dies or the pads in forming dies. More detailed explanation for the use of this table follows in a later chapter.

Fig. 25 is the table for estimating the time required to make the several kinds of stops. The type we designate "commercial" is an automatic stop manufactured commercially and delivered ready for installation. There are a variety of these on the market.

When estimating the time for removing material from nest plates, use the table in Fig. 19.

Three of the most commonly used types of knockouts are shown with their respective time values in Fig. 26 while several types of pressure and hold-down mechanisms are shown in Fig. 27.

A is a drawing of the standard type of outside pressure attachment. With it are shown the time values for four different types of pins which may be used with it. Several diameters of pressure plates are indicated.

B is a type of pressure mechanism which is not frequently used although it is a handy arrangement where space is

Types of Knockouts in Common Use

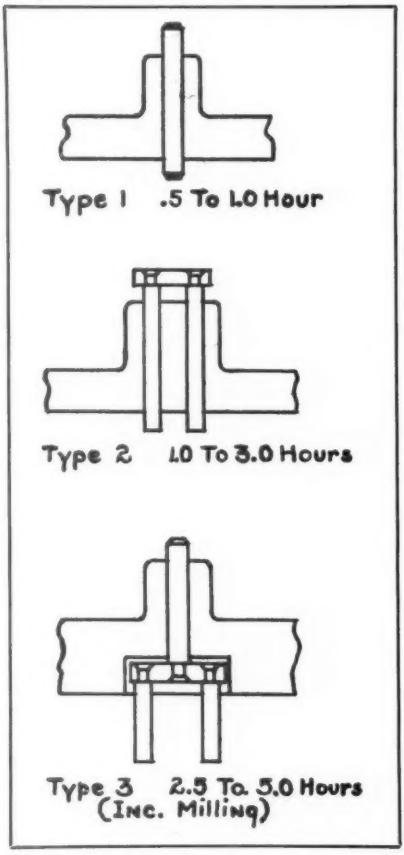


Fig. 26

Time Values for Drilling Holes to Hold Pilots

SIZE	TOL.	TIME
⅛ TO 1"	± .0015	.4
⅛ TO 1"	± .001	.9

Time includes clearance holes.

Fig. 24

Time Values for Making Stops

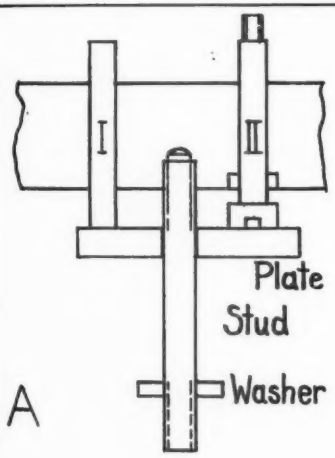
NUMBER REQUIRED	1	2	3
AUTOMATIC	3-5	4-6	6-9
COMMERCIAL	1.5-3.0		
FINGERSTOP	3.0	5.0	6.0
PINSTOP	1.0	2.0	2.0
SPRING PIN	1.0	2.0	3.0

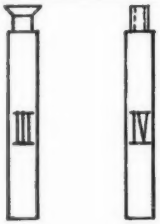
Time in hours.

Fig. 25

Types of Pressure and Hold-Down Mechanisms
Pad Parts for Forming and Compound Dies

Fig. 27





Time Values for Accessories

A—Standard Type of Outside Pressure Attachment

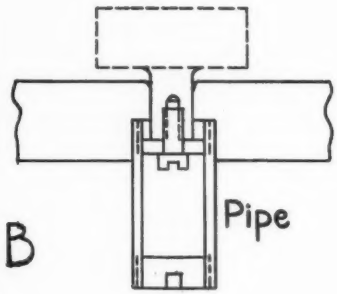
Stud—cut to length, threaded both ends, hole drilled and tapped in shoe..1.5 hours

Pressure Plate

3″	Diameter	....1.0 hr.
3½″	″	....1.2 hrs.
4″	″	....1.4 hrs.
5″	″	....1.7 hrs.
6″	″	....2.0 hrs.

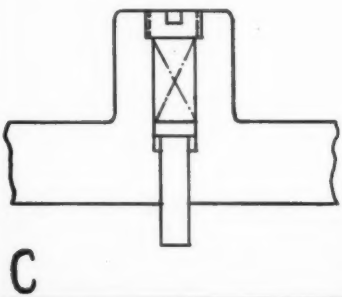
Washer .....0.5 hr.

Pins I.....0.5 hr.
II.....0.2 hr. each
III.....0.9 hr. each
IV.....0.8 hr. each



B—Limited Space, One Spring Mechanism

Pipe—cut to length, TBE, Plug, Washer and hole in shoe .....3.2 hrs.
Turn, drill and tap shank..... 1.0 to 2.5 hrs.



C—The very common Oil or Ejector Pin type

Spring Pin—In shank or in shoe .....1.7 hrs.

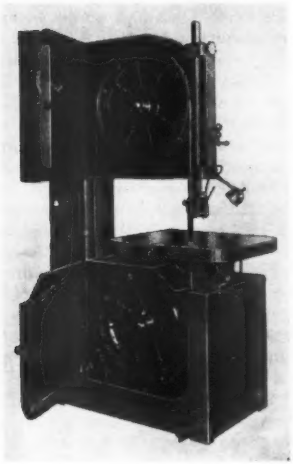
limited and one spring alone will do the work. C, known as the oil or ejector pin, should require no explanation because it

(Continued on page 45)

New Combination Band Sawing and Chain Filing Machine Developed by Grob Brothers

A NEW combination sawing and filing machine with a 24" throat has been designed and is now being built by Grob Brothers. The two 24½" diameter pulleys which make the 24" throat capacity possible, have inlaid rubber bands for the operation of the saw blade. Alongside of the bands in each pulley is a groove in which the file chain moves. The lower pulley has provision for a positive drive to the file chain which has the effect of insuring long life to the chain because very little tension is required. The saw blade and the file chain being alongside of each other, each operating in its own track, the change from sawing to filing or vice versa can be made immediately. Saw guides and file attachments are left in the machine at all times. Tension adjustment of the saw or the file chain is made with the hand crank shown at the upper right of the machine. Also there is an indicator which shows the tension exerted. Saw blades to be used for internal sawing are quickly welded on the butt welder mounted on the upright portion of the column.

The ½ HP motor drives the lower pulley by means of a V belt. Reduction drive provides 5 speeds: 60, 90, 135, 225 and 375 feet per minute for either the saw band or the file chain. The base and column on the new machine are of welded steel construction. The table, 24"x25", tilts in two planes and is made of cast iron. A table feed is provided which is operated by the foot lever shown at the lower right in the illustration. The new Model NS-24 has a height of 80" overall, the table being 40" from the floor. The die or work space, which is the distance from the table to the column, is 12⅜". The machine weighs 1500 pounds and requires a floor space 26"x42".



Left. — New model NS-24, combination sawing and filing machine. The open doors show the 24½" pulleys.

Right. — The file chain moves in a groove alongside the inlaid rubber bands for the saw blade but operates in its own track. Changes from sawing to filing and vice versa can be made immediately.

This new Grob model will be exhibited for the first time at the Machine and Tool Exhibition which is to be held at the Central Armory, Cleveland, Ohio, October 4th to 13th.

For more detailed information about the Model NS-24 Combination Sawing and Filing Machine, write Grob Brothers, Grafton, Wisconsin. Please mention TDM PROGRESS.

A **Reader Requested** Modern Equipment Article

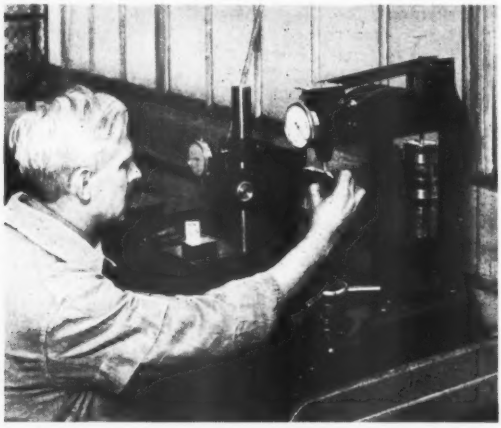
The Hardness Testing of Die and Tool Steels

By C. H. Wilson, President
Wilson Mechanical Instrument Co., Inc.

EVEN in the days when most tools were made of carbon steels, it was recognized that tools and dies were required to meet very divergent applications and requirements and that these different applications could be met to the best advantage only by making the tools of different hardnesses. Only by a hardness test could one be aware of even the approximate hardness of any tool.

With the rapid multiplication of alloy steels to meet an ever widening number of services and the improved technique of hardening processes, it has become even more important to tool rooms and die shops to be able to test steels for themselves. The available information as to proper hardness is large, important and useful. Manufacturers and large users have built up invaluable information on the composition and characteristics of steels used for every possible tool application. This has made extensive experimentation by tool rooms and die shops unnecessary. The "Rockwell" Hardness Tester permits the tool room to make use of this body of information and to conveniently gather and record their own information. The greater and greater demand for precision in the making of tools and dies practically is a demand for tools that will give longer service. Many shops that never before considered such equipment as the "Rockwell" Hardness Tester are now finding it necessary if they expect to compete for precision work.

Take, for example, the matter of die blocks made of alloy steel. One of the large electrical equipment manufacturers reported a year or two ago that, in their tool room, die blocks for high production and close tolerances were hardened to Rockwell C 52-55 when the impressions



Testing a piece of die steel in a Detroit shop. The operator has completed the setup and is taking a reading.

were to be less than ⅜", whereas die blocks for 1" impressions were hardened to C 44-46 and dies blocks for extremely deep impressions and for plastic molds and for drop forgings that were machined to size afterwards, the controlled hardness was C 35-37. Die strippers were made C 29-33 and shaving dies C 60-63. They found the best hardness for milling cutter teeth C 63-65, but milling cutter bodies for inserted teeth were held to C 30-35.

The "Rockwell" Hardness Tester is a single dial direct reading machine which indicates Hardness on the basis of increment of depth of penetration due to increment of load. It is, in effect, a combined press, weighing machine and micrometer. The single dial has both the "B" and "C" scales.

The penetrator customarily used on unhardened steels, phosphor-bronze, brass, cast iron and many alloys and metals not extremely hard, is a hardened steel ball ⅛" diameter, mounted in a chuck which is designed to permit replacement of ball in a few seconds. Work to be tested is placed on the anvil (four types to take care of practically every shape work are standard equipment) and the work is brought under pressure of the so-called "minor load" of 10 kgs (1 kilogram = 2.205 pounds), by turning the capstan hand wheel until the work specimen is in pressure contact with the penetrator. The correct pressure is reached when the small pointer is approximately on the dot and the large pointer is approximately vertical. Then the bezel rim of the dial is turned to bring the C-0 Set and B-30 line behind the large pointer, the work of a second or two. The load is then tripped and the 100 kgs major load is applied. The load is withdrawn as soon as the large pointer comes to rest. The large pointer indicates the B hardness number.

When testing hardened steel or hard alloys the "BRALE" Penetrator, which uses a standard major load of 150 kgs, is used. "C" Scale readings are obtained with the same procedure used for the "B" readings. The "BRALE" Penetrator is a sphero-conical diamond ground to mathematical and microscopic accuracy.

The principle of increment in depth due to increment in load or the depth of superimposed impressions, instead of measurement of total depth or total diameter, was adopted to (1) obtain readings more independent of original surface conditions; (2) to obtain readings without confusion through the deformation around the indentation where cold working distortion of various kinds takes place and (3) to make precision testing possible at a rapid testing rate without loss of accuracy. Average operators in a tool room can make the entire operation of testing in from five to ten seconds.

A milling cutter being tested for hardness. The simplicity of the test makes it possible to individually check pieces and parts of a considerable tooling program or production.

The "Rockwell" Hardness Tester is made in several sizes and types—the standard machine recommended for general tool room use is the Model 3-R, the 8" vertical capacity tester. Work support accessories for pieces of long overhang, anvils for supporting round rod and tubing and an adapter for internal testing are available. The "Rockwell" Hardness Tester, recognized all over the world, is standard equipment in about 2000 American tool rooms and in over 1000 shops in Europe. Over 9000 "Rockwell" Hardness Testers are in use in industrial plants, mills, laboratories, tool rooms and die shops.

The Rockwell Hardness Tester has

(Continued on page 45)

Dannes Die Estimating Series to be Published in Book Form

THE series of articles on Die Designing and Estimating by George Dannes which is now appearing in monthly installments in Tool-Die-Machine PROGRESS is to be ready soon in book form.

This second volume of the series will be complete with the text, tables, drawings and charts already published serially and the descriptive material which is yet to appear.

This new method of estimating die costs, with its copyrighted tables and charts, has attracted the attention of thousands of designers, builders and users of dies. Shop owners and executives, engineers, superintendents and production men—all are interested in getting away from the hazards of "guesstimating" die costs.

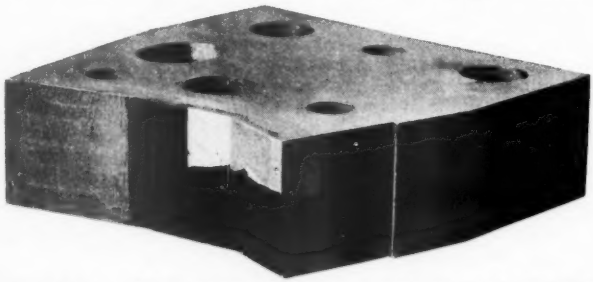
The pre-publication price of this new book which follows the preliminary series by Charles Bohmer will be $1.55 and it is expected that the forms and tables which are continually required for reference and use by the estimator will also be available in convenient form.

Clark Elected President of FCC

At a meeting of the board of directors of The Forging and Casting Corporation recently held, Kenneth L. Clark was elected president. Mr. Clark was one of the original incorporators of the company and has been its vice president and general manager.

Beginning in a comparatively small plant in June 1929, FCC has developed a group of forged and cast specialties until today their volume has grown to make of it a tonnage business. These products include forged rings, discs, blanks and special shapes in sizes and weights up to 6,000 pounds; composite steel die sections; parts of Nitri-Cast-Iron developed particularly for parts which must resist extreme wear. The company manufactures its own special alloy steels and casts tool steels to shape.

Don't Throw Away Your Damaged Dies!
There Are Means For Rescuing Them



WELDING RODS specially adapted for perfect results in *Precision Welding*—particularly *facing* and *restoration* of Tools and Dies. *Send today for Full Information*

The above die was repaired with DARWIN'S WELDING RODS, each of which has been especially adapted *through research* for the base metal of which it must become a part.

DARWIN & MILNER, Inc.
High Grade Tool Steel Specialties
1260-64 West 4th Street Cleveland, Ohio

When you order or write about products described in TDM PROGRESS please mention the publication.

Don't miss

THE MACHINE AND TOOL EXHIBITION

Central Armory

Cleveland, Ohio

October 4 - October 13

Get the complete picture of the latest developments in machine shop equipment and practice at the Machine and Tool Exhibition. Many new time and money saving metal-working machines and tools will be on display for the first time. Don't miss this opportunity to get the complete picture—see what's new in the industry—get ideas for more efficient and modern operation of your shop. Plan today to spend October 4th—13th in Cleveland—at the Central Armory. ***For further information, write***

GROB BROTHERS **GRAFTON, WIS.**

When you order or write about products described in TDM PROGRESS please mention the publication.

HERE ARE REAL PRODU

Copyright 1938 by The Forging and Casting Corporation.

PRODUCTS AND SERVICES

IN 10 short years FCC has grown to its important position because its Products and Services have made it possible for manufacturers of the widest variety of products and the designers and builders of dies, tools and machines to reduce their costs and at the same time improve their products.

Here are examples of FCC

TOOL Steels Cast to Shape—Air Hardening, Oil Hardening and Alloy . . . The FCC organization has pioneered *casting tool steels to shape* and has developed the modern methods which assure FCC uniformity of quality . . . All are manufactured in electric furnaces, under strict laboratory control with very accurate foundry practice. Automatically controlled furnaces assure uniform annealing.

Outstanding characteristics of FCC Cast to Shape Tool Steels are their inherent wear-resisting properties and capability of hardening without distortion . . . Remarkable results are on record for widely differing uses:

- Broaches
- Bushings
- Cams
- Dies:
  - Bakelite
  - Ball Making
  - Beading
  - Blanking
  - Can
  - Ceramic
  - Coining
  - Crimping
  - Cutting
  - Drawing
  - Extrusion
  - Forming—Hot and Cold
  - Heading
  - Nail and Tack
  - Pressing
  - Slotting
  - Stamping
  - Swaging
  - Thread Rolling
  - Trimming
- Gauges: Plug, Thread, Ring
- Guides
- Impression Die Hobs
- Knurling Tools
- Mandrels

- Printing Press End Rings and Rolls, etc.
- Pulverizing Blades
- Punches
- Rolls
- Shear Blades
- Slitting Cutters
- Swedges
- Taps
- Tools for:
  - Burnishing
  - Knurling
  - Spinning
- Wearing Parts of Machines

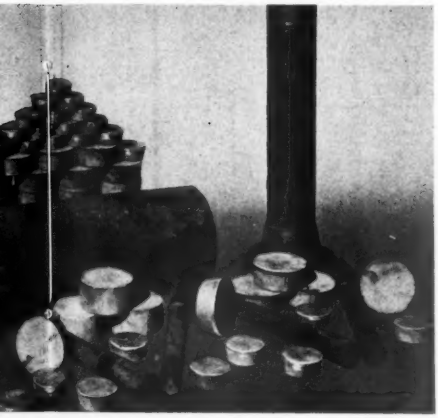
FCC AIR HARDENING TOOL STEEL Cast-to-shape is immune to cracking during heat treatment.

RODUCT-COST REDUCERS!

Forgings and Castings—some of the parts which have effected such radical savings in so many instances.

FCC Distributors and Engineers cover the Country. They would welcome the opportunity to consult with manufacturers everywhere.

Please write us.



Hot Work Steels

FCC has developed special steels for rams, mandrels, dummy blocks, extruding dies and liners, also containers for the hot work industry, such as brass, aluminum and copper.

NITRI-CAST-IRON—the alloy which has answered Industry's demand for a really satisfactory wear-resistant. Its performance in hundreds of products has been unequalled. A few of the products for which Nitri-Cast-Iron permanent mold, centrifugal and sand castings are being used so effectively are:

Metal Weaving Machine Cylinders; Automotive Sleeves; Wet and Dry Fine Wire Drawing Heads; Pump Liners, Cylinders, Thrust Plates, Bodies, Bushings and Rotors; Crank Shafts; Valve Guides; Glass Molds; Oil Well Slips; Wire Drawing Idlers; Textile Spinning Rings; Canning Machine Disks; Pneumatic Grinder Cylinders; Sleeve Bearings; Textile Wear Guides; Cams; Valves; Plungers; Wear Pads for Feed Fingers; Refrigerator Seal Rings.

N-C-I HARDENS TO
900/950 BRINELL!

FCC

THE FORGING AND CASTING CORPORATION

FERNDALE (DETROIT) MICHIGAN

COMPOSITE STEEL DIES · TOOL STEEL CAST TO SHAPE
TOOL AND ALLOY STEEL FORGINGS · NITRI-CAST-IRON

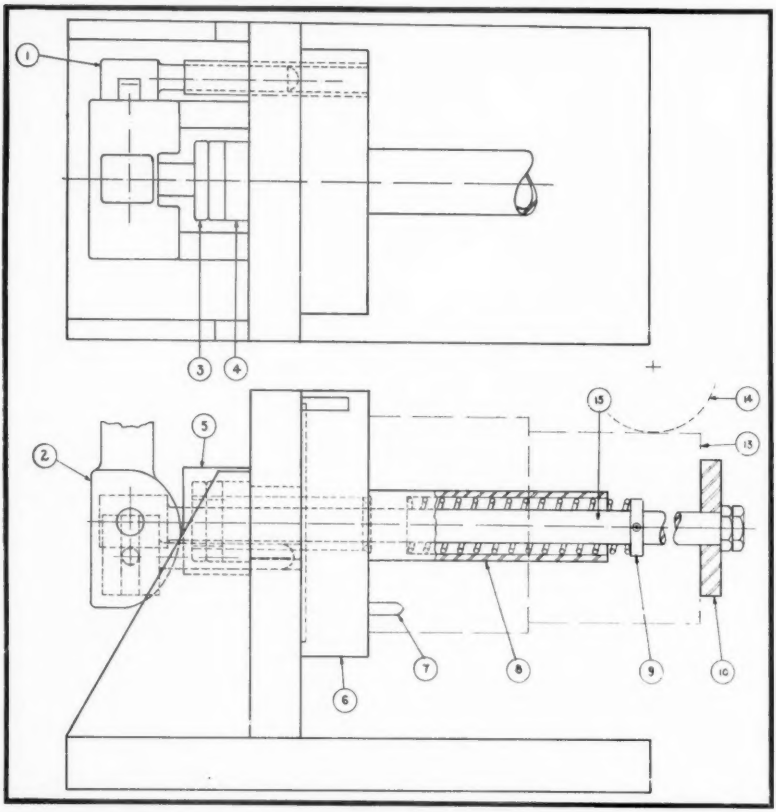
Shop Kinks

This Department, created by the interest of our readers, will be a regular feature of T·D·M PROGRESS. Readers are invited to send their "pet" shop hint or kink to the Editor.

An Index Fixture for Milling Parallel Oil Grooves

THE problem facing the designer of this fixture was to mill two parallel oil grooves space 90° apart on the surface of a differential valve piston. The grooves were not to extend past the end of the piston, the cut starting as shown by the position of the cutter (14). Consequently, a hand milling machine was chosen as a proper machine tool. Location of the piston on the fixture was maintained with the locating pilot (8) in a bored hole and a locating pin (7) in a drilled hole in the end face. The fixture is illustrated in the unclamped position.

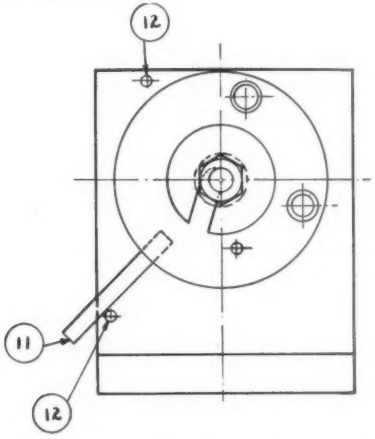
The motivating elements of the fixture



are the index plate (6) made of hardened tool steel and pressed on the locating pilot (8); a bullet nose index pin (1); draw bar (15) and the cam clamp

(2). Indexing movement is permitted by locking the pilot with locknuts (3), leaving a few thousands clearance over the combined thicknesses of the index plate, angle plate and the head of the hardened pilot bushing (4).

Approximate location for indexing is provided by dowel pins (12) which control the movement of the index plate actuating handle (11). A pin pressed in the side of the cam on the vertical center line and eccentric to the draw bar retaining pin, moves in a groove in the index pin. As the cam is rotated for clamping the index pin is forced forward into the index plate, thus securing positive location. The "C" washer is slotted off-center to reduce the tendency to drop off while in the free position for indexing. A spring restrained by a shoulder in the locating pilot and the draw bar collar keeps the cam against the face of its cleats (5).



The angle plate of this fixture was welded machine steel normalized to insure against work stress relieving. Oil hardening tool steel was used for the indexing pin and SAE 1020 carburized and hardened in the locating pilot. The draw bar is SAE 2340, heat treated to 35 Rockwell for best fatigue resistance and toughness. The cam and cleats are machine steel, not hardened. While case hardening would eliminate wear, it would also reduce the surface friction necessary to hold the cam clamped.

(Continued on page 46)

Can You Grind and Fit DIFFICULT PROFILES IN MINUTES ?

In making estimates for dies and special machine work, do you have to allow for hours and hours of hand work when the work involves grinding and fitting difficult contours, odd shapes and uneven surfaces?

With Boyar-Schultz Profile Grinders workmen can develop their skill in Tool and Die making to the fullest extent, doing this difficult type of work in MINUTES when it formerly took HOURS . . . . and they can do it BETTER. Finishing hard-to-get-at surfaces that usually requires hand work is accomplished quickly.

Boyar-Schultz
HEAVY DUTY PROFILE GRINDER No. 2 With MULTI-PURPOSE HEAD

was designed and developed by Tool Engineers who are thoroughly familiar with the everyday problems of the tool and die maker. It is a smooth running machine tool that efficiently handles tool and die work of larger and more difficult types. With it, heel or base punches can be ground in full view. All controls are located to operate conveniently from the front; large table tilts 10°; ball bearing 2 H. P. motor turns either spindle at approximately 10,000 R. P. M. with vertical oscillations of 100 per minute. Its HIGH SPEED makes it a rapid stock remover, even with small diameter wheels.

Boyar-Schultz Portable Profile Grinder No. 1

is solving the countour grinding problems for hundreds of shops in this country and abroad. It is a TIMESAVER on smaller work in shops requiring grinding and fitting to close limits. Operates at approximately 20,000 R. P. M.

WRITE FOR DESCRIPTIVE LITERATURE

BOYAR-SCHULTZ CORPORATION
2112 Walnut Street Chicago, Ill.

When you order or write about products described in TDM PROGRESS please mention the publication.

Danly Announces New Precision Die Set Line

A NEW and enlarged line of precision die sets is announced by Danly Machine Specialties, Inc. These are available in a wide range of sizes of regular, reverse and long narrow die sets for any die ranging in size from 3″x3″ to 25″x14″ and in many thickness combinations of die holder and punch holder.

A new "Square" series of back post sets for mounting square and round dies, likewise in a complete range of sizes from 3″x3″ to 14″x14″, have been developed and are now available.

All Danly precision die sets are assembled with precision guide posts and bushings. The guide posts are hardened, ground and lapped to tolerances of plus or minus one-ten-thousandth of an inch. Precision bushings used are either standard, shoulder or extra long types and are ground and honed to the same accurate limits.

Above: Assembly line, Danly Cleveland branch.

Below: Regular, reverse and long narrow Danly Precision Die Sets.

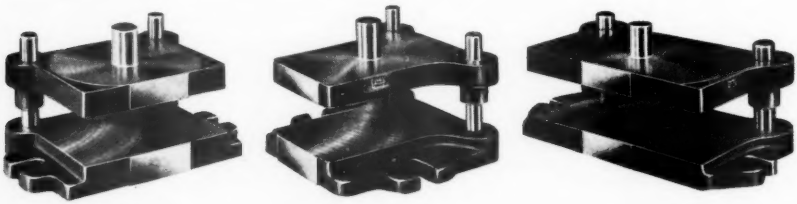
Danly precision die sets are interchangeable, that is any die holder or punch holder with the same center distances fits every other die or punch holder of the same dimensions. Inasmuch as every Danly die set is assembled to order from the customer's specifications, this accurate manufacture makes a large variety of thickness combinations available. Assembly operations and complete stocks are maintained at each of the company's eight branches.

The commercial line of die sets also includes all of the new types and sizes.

Announcement of the new line is made in a new catalog a feature of which is a graphic chart showing the complete range of sizes of standard back post sets which is said to make selection of the correct size a simple and more certain procedure.

Many of these new types and sizes have been developed at the suggestions of extensive users of die sets or as the result of research conducted among die designers and builders whose growing needs indicate the desirability of standardizing the new types.

The new Danly catalog is available to all designers, builders and users of dies and die making accessories. Write Danly Machine Specialties, Inc., 2121 South 52nd Avenue, Chicago, Illinois. Please mention TDM PROGRESS.



Economical Production Stampings

(Continued from page 13)

to .125" in thickness. Manufacturing in this industry cannot possibly be considered as mass production, consequently many of the parts have been hand fabricated heretofore.

The Guerin process employs a hydraulic press. A block of live rubber forces the Duralumin sheet under high pressure into dies which draw and form parts smoothly and without wrinkles. A hydraulic press is a comparatively expensive piece of equipment and therefore this process was logically developed to form more than a single piece at one time.

The Bethlehem Method

Within the last year the Bethlehem Ship Building Company, seeking a better method for producing small quantities of stampings, hit upon the idea of using a continuous sawing and filing machine** in a unique way. These metal sawing and filing machines have come into quite general use in Contract Die Shops and the Die Departments of the production industries during the last few years. They do the finest precision cutting of all kinds of metals from the hardest high carbon steel to soft brass, copper and aluminum.

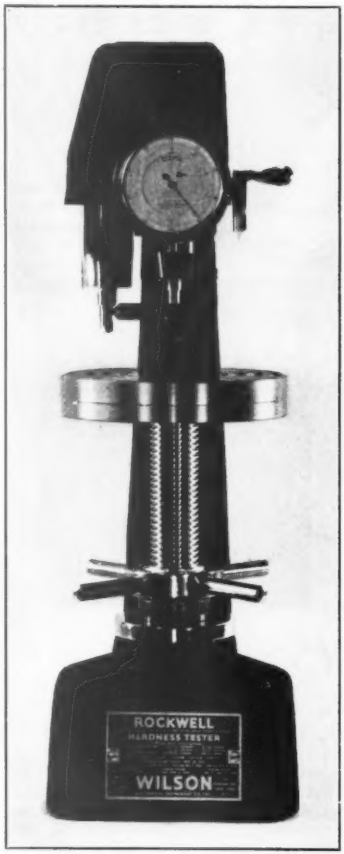
Metal sheets to a height which the saw can handle efficiently are stacked and welded or soldered together. The welding or soldering is easily accomplished by compressing the sheets tightly in an arbor press. With smaller parts a bench vise may be used. Soldering is recommended for light stock and arc-welding for larger pieces and heavier gage sheets. By exerting pressure on the stacked sheets they will be better bonded, warps will be removed and the sawing will be no different than if it was being done in a solid piece of metal.

For laying out the shape to be sawed either a templet is used or the form is indicated on the top piece with conventional drawing instruments. Either simple or intricate shapes may be machined. The controlling factor as to time is not

(Continued on next page)

***In this instance the Doall Contour Machine.*

"ROCKWELL"
HARDNESS TESTER



Acknowledged Accuracy

WILSON
MECHANICAL INSTRUMENT CO., INC.
387 Concord Ave. New York

When you order or write about products described in TDM PROGRESS please mention the publication.

Gear Specialties

SMALL GEARS

SPURS
SPIRALS
BEVELS
WORM-GEARING
RACKS
RATCHETS
SEGMENTS

SMALL GEARS

—in the finer pitches
—14 to 96 D.P.

Precision
Screw Threads

Can be accurately ground out of the solid AFTER HARDENING. Thus made, distortion errors are corrected and the threads are clean, smooth, held to very close limits and *concentric with axis.* These elements are extremely important in high speed spindles and numerous other shafts requiring *true* threads on which a nut can be drawn up "dead square." If you have such problems, consult—

Made to order ONLY—*No Stock—No catalog*

Gear Specialties
INCORPORATED
CHICAGO

2640 W. Medill Ave. Phone Humboldt 3482

Economical Production Stampings

(Continued from page 29)

so much the length as it is the contour of the product line. A circle cutting attachment is used when simple circular pieces are to be sawed.

The number of pieces which can be produced economically in this way can be determined best by the user of the machine but it has been demonstrated that any quantities up to 500 pieces can be contour-machined economically and there probably are circumstances which would make it profitable in quantities up to several thousand. The labor cost per piece is undoubtedly high compared with such cost when a punch press is used but to attain the production which is economical on a press, the die cost must first be considered.

The illustrations show typical parts which may be economically contour-sawed and finish-filed. Fig. 1 shows pieces made of scrap which resulted from power press stampings. This accounts for the identical shapes of the original sheets as well as the round corners. The possibility and economy of using such scrap pieces is readily apparent.

Figs. 2 and 3 are both described in detail in the captions accompanying them. Fig. 4 shows the method for holding a stack of small pieces in an arbor press while they are being arc-welded preliminary to being contour-sawed. While those actually in the press are of uniform size, another stack may be seen which varies in lengths.

Contour-Sawing Has Limitations

Contour-sawing for producing "stampings" has its limitations. To expect to do forming or piercing press work is out of the question. For the sawing of flat blanks in small quantities it should prove to be a genuine contribution to the lowering of costs.

This use of continuous sawing and filing machines for precision products is unusually interesting to the die builder because it employs equipment already in his shop. One of the difficulties sometimes experienced in tool rooms and die shops is that the operation of much of the equipment is intermittent. The development of this type of work opens up possibilities for the more extended use of such equipment.

When you order or write about products described in TDM PROGRESS please mention the publication.

Buy With Confidence

ABRASIVE PAPER AND CLOTH
Carborundum Co., Niagara Falls, N. Y.
AIR CONDITIONING APPARATUS
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.
ASSEMBLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.
BARS—Rolled Composite
Forging and Casting Corp., Ferndale (Detroit), Michigan.
BEARINGS—Ball, Roller and Thrust
Ohio Ball Bearing Co., 6531 Euclid Avenue, Cleveland, Ohio.
BENDING MACHINES—Special
McKinney Tool & Mfg. Co., The, 1688 Arabella Rd., Cleveland, Ohio.
BOLTS—Stripper
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
BORING BARS
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Michigan.
BORING MILL—Cutters
Modern Collet & Machine Co., 407 Salliotte St., Ecorse, Mich.
Progressive Tool & Cutter Co., Ferndale, Mich.
BUSHINGS—Die
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
BUSHINGS—Drill Jig
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Ex-Cell-O Corporation, 1228 Oakman Bl. Detroit, Mich.
CARBIDE ALLOY TOOLS and BLANKS
McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa.
CASTINGS—Air and Oil Hardening Tool Steel Cast to Shape
Detroit Alloy Steel Co., Foot of Iron St., Detroit, Mich.
Forging and Casting Corp., The, Ferndale (Detroit), Mich.
CASTINGS—Flamaloy
Detroit Alloy Steel Co., Foot of Iron St., Detroit, Mich.
CASTINGS— Nitri-Cast-Iron
Forging & Casting Corp., The, Ferndale (Detroit), Mich.

● This directory of products lists for ready reference the names of manufacturers and dealers whose sales to Tool·Die·Machine PROGRESS readers have established them as dependable in every sense of the word. They merit your consideration.

● Complete information about any product may be had upon request made to the firm listed or to us.

● Your mention of Tool·Die·Machine PROGRESS will be appreciated.

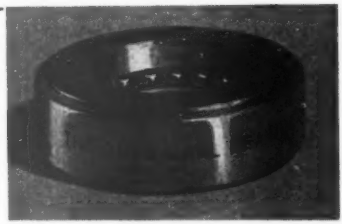
CHUCKS—Collet
The Tomkins-Johnson Co., 630 North Mechanic St., Jackson, Mich.
CHUCKS—Magnetic
Arlavox Mfg. Co., 428 S. Green St., Chicago, Ill.
CLAMPS—Die
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
CLAMPS—Toggle
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.
COLLETS—Lathe and Milling Machine
Modern Collet & Machine Co., 407 Salliotte St., Ecorse, Mich.
CONTOUR METAL-WORKING MACHINES
Continental Machine Specialties, 1301 S. Washington Ave., Minneapolis, Minn.
COUNTERBORES
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix Ave., Detroit, Mich.
CRANKSHAFTS—Heat Treated for Presses
Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit, Mich.

CUTTERS—Die-sinking
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Mich.
The Tomkins-Johnson Co., 630 North Mechanic St., Jackson, Mich.
CUTTERS—Hard Carbide
McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa.
CUTTERS—Milling
Goddard & Goddard Co., Inc., 12228 Burt Road, Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix, Detroit, Mich.
CUTTERS—Multi Diameter
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Mich.
CUTTERS—Serrated Blade
Goddard & Goddard Co., Inc., 12228 Burt Road, Detroit, Mich.
CUTTING MACHINES—Hand & Power
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.
CYLINDERS—Hydraulic
Hanna Engineering Works, 1759 Elston Ave., Chicago, Ill.
CYLINDERS—Pneumatic
Hanna Engineering Works, 1759 Elston Ave., Chicago, Ill.
DE-MAGNETIZER
Arlavox Mfg. Co., 428 So. Green St., Chicago, Ill.
DIAMOND STONES
Carborundum Co., Niagara Falls, N. Y.
DIAMOND WHEELS
Carborundum Co., Niagara Falls, N. Y.
DIE CASTING MACHINES
Phoenix Machine Co., The, W. 28th and Church Sts., Cleveland, Ohio.
DIE—Hard Carbide Inserts
McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa.
DIE MAKERS SUPPLIES
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
DIE MAKING MACHINES
Continental Machine Specialties, Inc., 1301 Wash. Ave., Minneapolis, Minn.
Grob Brothers, Grafton, Wis.

THRUST BEARINGS

for every type of machine and position of application.

All leading ball and roller thrust bearings, banded as shown or without band and using steel or bronze retainers. Also all types of ball and roller bearings and transmission equipment.



Special sizes made to your blue print
Any quantity

AKRON COLUMBUS **THE OHIO BALL BEARING CO.** CLEVELAND YOUNGSTOWN TOLEDO CINCINNATI

DIE SECTIONS—Composite Steel
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
Forging and Casting Corp., Ferndale (Detroit), Michigan.

DIE SECTIONS—Forged
Ajax Steel and Forge Co., 205 Adair St., Detroit, Mich.

DIE SETS
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

DOWEL PINS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

DRESSING STICKS
Carborundum Co., Niagara Falls, N. Y.

DRILLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.

DRILL JIG—Toggle Action
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.

DRILL JIG BUSHINGS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.

DRIVE UNITS—Motorized
Drive-All Mfg. Co., 3402 Conner Ave., Detroit, Mich.

ELEVATING TABLES—Portable
Hamilton Tool Co., The, 222 North B Street, Hamilton, Ohio.

END MILLS
Progressive Tool & Cutter Co., Ferndale, Michigan.
The Tomkins-Johnson Co., 630 North Mechanic St., Jackson, Mich.
Putnam Tool Co., 2985 Charlevoix, Detroit, Mich.

EXTRACTOR—Broken Tap
The Walton Co., 88 Allyn St., Hartford, Conn.

FILES—Rotary
Hamilton Tool Co., The, 222 North B Street, Hamilton, Ohio.

FILING MACHINES—Continuous
Continental Machine Specialties, Inc., 1303 Washington Ave., S., Minneapolis, Minn.
Grob Brothers, Grafton, Wis.

FORGINGS—General
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.

FORGINGS—Water and Oil Hardening, High Speed, Special Alloy, Stainless and S. A. E. Steel
Forging and Casting Corp., Ferndale (Detroit), Michigan.

GAGES—Spring Stop
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.

GAGE BLOCKS
Ford Motor Co., Johansson Div., Dearborn, Mich.

GEARS—Special—14 to 96 D.P.—Made to order only
Gear Specialties, Inc., 2640 W. Medill Ave., Chicago, Ill.

GRINDER—Hydraulic Feed
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids, Mich.

GRINDER—Surface
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids, Mich.

GRINDER—Precision for Contours
Boyar-Schultz Corp., 2114 Walnut Street, Chicago, Ill.
Koestlin Tool & Die Corp., 3601 Humboldt Ave., Detroit, Mich.

GRINDING & LAPPING—Precision
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.

GRINDING WHEELS
Carborundum Company, The, Niagara Falls, New York.

GUIDE PINS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

HONING SERVICE
Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit, Mich.

HONING STICKS
Carborundum Co., Niagara Falls, N. Y.

JIG BORING TOOLS
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Michigan.

LAPS—Copper Head Expansion
Boyar-Schultz, Inc., 2114 Walnut Street, Chicago, Ill.

LAPPING COMPOUND
Carborundum Co., Niagara Falls, N. Y.

LAPPING MACHINES
Schraner & Co., A. P., 3338 Payne Ave., Cleveland, Ohio.

LEADER PINS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

MACHINE BASES—Fabricated
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

MACHINE REBUILDING
Enterprise Machine Parts Corp., 2731 Jerome Avenue, Detroit, Mich.

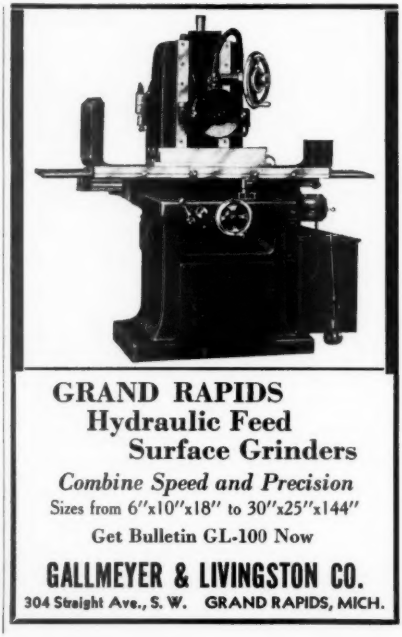
MACHINE REBUILDING—Screw Machines
Modern Collet & Machine Co., 407 Saliotte St., Ecorse, Mich.

MAGNETIC SINE TABLE
Omer E. Robbins Co., 637 Mt. Elliott Ave., Detroit, Mich.

MARKING DEVICES
New Method Steel Stamps, Inc., 149 Joseph Campau, Detroit, Mich.

MILLING MACHINES—Vertical
Kearney & Trecker Corp. West Allis Station Milwaukee, Wisc.

Columbia
TOOL STEEL
Insured Tools
Controlled tool steel means INSURED TOOLS—insured for top performance, life and service.
It pays to use Good Tool Steel.
COLUMBIA TOOL STEEL COMPANY
ARTHUR T. CLARAGE PRESIDENT

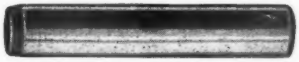


MILLING MACHINES—Continuous
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.
NUMBERING DEVICES
H. O. Bates, 251-257 North Broad St., Elizabeth, N. J.
POLISHING & BUFFING MACHINES—Automatic Continuous
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.
POLISHING GRAIN
Carborundum Co., Niagara Falls, N. Y.
PUNCHES—Hand, Toggle Action
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.
PUNCHES—Standard & Interchangeable
Hovis Screwlock Co., 3129 Larned St., E., Detroit, Mich.
REAMERS
Putnam Tool Co., 2985 Charlevoix Ave., Detroit, Mich.
REAMER—Self-centering Cylinder
Royal Oak Tool & Machine Co., 621 E. Fourth Street, Detroit, Mich.
REPAIR PARTS FOR MACHINERY
Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit, Mich.
REPAIR PARTS—Screw Machine
Modern Collet & Machine Co., 407 Salliotte St., Ecorse, Mich.
RETAINERS—Punch & Die
Hovis Screwlock Co., 3129 Larned St., E., Detroit, Mich.
RIVETING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.
Hanna Engineering Works, 1759 Elston Ave., Chicago, Ill.
ROLLER DIE FORMING MACHINES
McKinney Tool & Mfg. Co., The, 1688 Arabella Rd., Cleveland, Ohio.
SAND BLASTING
Porter Steel Treating Co., The Geo. H., 1225 Marquette St., Cleveland, Ohio.
SAW & SHEAR CUT-OFF MACH.—Automatic
McKinney Tool & Mfg. Co., The, 1688 Arabella Rd., Cleveland, Ohio.
SAWING MACHINES—Continuous
Continental Machine Specialties, Inc., 1303 So. Washington St., Minneapolis, Minn.
SAWING MACHINES—Metal
Armstrong-Blum Mfg. Co., 5743 Bloomingdale Ave., Chicago, Ill.
SAWING MACHINES—Open End
Grob Brothers, Grafton, Wis.
SCREW MACHINE PRODUCTS—Contract
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, Ohio.
Ulmer Co., The J. C., 1791 East 38th St., Cleveland, Ohio.
SCREW MACHINE PRODUCTS—Hardened & Ground
Acme Industrial Co., 206 No. Laflin St., Chicago, Illinois.
SCREWS—Socket Head
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio.
SCREWS—Transfer
Nielsen Tool & Die Company, 1859 Gardner Ave., Berkley, Michigan.
SCRIBERS
Ford Motor Co., Johansson Div., Dearborn, Mich.
SHARPENING STONES
Carborundum Co., Niagara Falls, N. Y.
SHEARS—Bolt & Rivet—Automatic
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.
SINE BARS
Ford Motor Co., Johansson Div., Dearborn, Mich.
SPACERS—For Milling Machine Arbors
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.
SPRING MAKING MACHINERY
Sleeper & Hartley, Inc., Worcester, Massachusetts.
SPRINGS—Die
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
STAMPINGS
Barth Stamping & Mach. Works, W. 34th & Denison, Cleveland, Ohio.
Davis Tool & Engineering Co., 6481 Epworth Blvd., Detroit, Mich.
Denning Mfg. Co., The, 1775-81 E. 87th St., Cleveland, Ohio.
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.
Modern Tool & Die Co., P. O. Box 2741, Cleveland, Ohio.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, Ohio.
Star Tool & Die Works, 2522 24th St., Detroit, Mich.
Ulmer Co., The J. C., 1791 East 38th St., Cleveland, Ohio.
Variety Machine & Stamping Co., The, 12695 Elmwood Ave., Cleveland, Ohio.
STAMPS—Steel
H. O. Bates, 251-257 North Broad St., Elizabeth, N. J.
New Method Steel Stamps, Inc., 149 Joseph Campau, Detroit, Mich.
STEEL—Alloy
Columbia Tool Steel Co., 410 East 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1260-1264 West Fourth Street, Cleveland, Ohio.
Wheelock-Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Mass.
STEEL—Carbon
Columbia Tool Steel Co., 410 East 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1260-1264 West Fourth Street, Cleveland, Ohio.
STEEL—Chromium
Darwin & Milner, Inc., 1260-1264 West Fourth St., Cleveland, Ohio.
STEEL—"Cobalt"
Darwin & Milner, Inc., 1260-1264 West 4th St., Cleveland, Ohio.
STEEL—High Speed
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.
Columbia Tool Steel Co., 410 East 14th Street, Chicago Heights, Ill.
Darwin & Milner, Inc., 1260-1264 West 4th St., Cleveland, Ohio.
STEEL—Stainless
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.

STANDARDIZED DRILL JIG BUSHINGS

ACME

TRY ACME BETTER BUSHING SERVICE



● Lead their field with consistent Quality and Service.
Scientifically measured drill clearances.
Concentric within .0003" Full Indicator Reading.
Heat treated to 62-64 Rockwell hardness.
Shipments from stock of 6700 ACME Standard items and 4200 A.S.A. Standard items.

●

ACME Leader Pins and Bushings, and Dowel Pins maintain the same standards of accuracy.

●

We also specialize in complete machine part manufacture requiring extremely close limits, lapped fits, etc., for pressures up to 20,000 pounds per square inch.

●

Send for complete catalog or specific data sheets.

SPECIAL BUSHINGS MADE ON VERY SHORT NOTICE

ACME INDUSTRIAL CO.
206 No. Laflin Street Chicago, Illinois

STEEL—Tool & Die
Columbia Tool Steel Co., 410 E. 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1260-1264 West 4th St., Cleveland, Ohio.
Wheelock-Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Mass.

STEEL PLATE—Ground
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

STEEL PLATE—Rough or Machined Torch Cut Shapes
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

STEEL TREATING—Hardening
Porter Steel Treating Co., The Geo. H., 1225 Marquette St., Cleveland, Ohio.
Sal-way Steel Treating Inc., 624 W. Elizabeth St., Detroit, Mich.

STRAIGHTENING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

TAP EXTRACTOR
The Walton Co., 88 Allyn St., Hartford, Conn.

TAPPER—Precision
The Master Tapper Co., 2 Main St., Belleville, N. J.

TAPPING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

TESTING MACHINE—Hardness
Wilson Mechanical Inst. Co., Inc., 387 Concord Ave., N. Y. C., N. Y.

TOOLS AND DIES—Carboloy
Kiffer Tool & Die Co., 5601 Tillman Ave., Cleveland, Ohio.

TOOLS—Cemented Carbide Tipped
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Mich.
McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa.

TOOL CHESTS
Gerstner Tool Chests, 56 Columbia St., Dayton, Ohio.

TRANSFER SCREWS
Nielsen Tool & Die Co., 1859 Gardner Avenue, Berkley, Michigan.

TRANSMISSION NUTS
Ohio Ball Bearing Co., 6531 Euclid Avenue, Cleveland, Ohio.

TUBING—Tool Steel
Bissett Steel Co., The, 947 E. 67th St., Cleveland, Ohio.

TYPE HOLDER
H. O. Bates, 251-257 North Broad St., Elizabeth, N. J.

VALVES—Operating
Hanna Engineering Works, 1759 Elston Ave., Chicago, Ill.

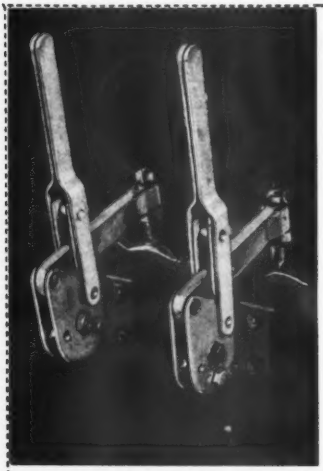
VENTILATING APPARATUS
Buffalo Forge Co., 477 Broadway, Buffallo, N. Y.

WASHERS—Special
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.

WELDING
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Overly-Hautz Co., 1617 West 116th St., Cleveland, Ohio.
Star Tool & Die Works, 2522 24th St., Detroit, Mich.

WELDING PLIERS
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.

WELDING RODS
Darwin & Milner, Inc., 1260-1264 West 4th St., Cleveland, Ohio.



WRITE FOR 1939 CATALOG

KNU-SINE TOGGLE CLAMPS
. . . . with the universal action are the simplest, fastest, and cheapest method of locating or clamping parts in jigs, dies, fixtures.
KNU-VISE INCORPORATED
6433 Cass Ave., Detroit, Mich.
AGENTS THROUGHOUT THE WORLD

No Mushrooming ▶
No Chipping ▶
Oversize Shanks ▶
Exclusive Knurled Back ▶
Exclusive Thumb Grip ▶
Broach-Rounded ▶ Corners

and a complete line of Marking Devices

Write for Price and data Bulletin No. 113-12.

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit

THE GEO. H. PORTER STEEL TREATING CO.
Tool Work Our Specialty
• *Heat Treating*
• *Annealing*
• *Carburizing*
• *Case Hardening*
• *Sand Blasting*
1271 East 55th St. Tel. HEnderson 6601 Cleveland, Ohio
Write or phone for our copyrighted Hardness Conversion Chart

When you order or write about products described in TDM PROGRESS please mention the publication.

Motorizing Pays Dividends

IT would seem to be almost unnecessary to point out the advantages of individually motorized machine tools, presses, production machines and all other types of power driven equipment were it not for the fact that there is still so much overhead shafting in use.

An individually motor driven machine is a much more flexible production unit. Power is consumed only when it is actually in operation. In tool rooms, die shops, contract stamping plants and the many manufacturing establishments whose products and quantities necessitate short runs and thus frequent change-overs and re-tooling, this saving is very apparent.

Shafting, pulleys and long belts require no small amount of upkeep and maintenance. Being in constant operation, frequent oiling and adjustment are necessary, in fact, should be done every day. In even moderate size shops this requires several hours time and always there should be considered the safety of the employee who climbs about on ladders to do the job.

The market offers numerous motorizing units, many of which still require belt shifting to various pulley steps for

speed variations. In present day practice the use of suitable speeds is an im-

(Continued on page 46)

Experience - Equipment - Workmanship - Service

Check every one of these factors before you ask for estimates. The companies who are our oldest and most consistent customers have done so.

Complete Contract Shop Service

Special Machine Building

DIES — MOLDS — TOOLS — GAGES — JIGS — FIXTURES
PRECISION PARTS — GENERAL MACHINE WORK

Send us your prints for estimates

THE BUNELL MACHINE & TOOL CO.

1620 East 24th Street *Telephone PRospect 2681* Cleveland, Ohio

When you order or write about products described in TDM PROGRESS please mention the publication.

Chrome Plating of Cylinder Surfaces Increases Efficiency

What is regarded as the first use of chrome plating for the interiors of non-rotating cylinders for compressed air and water hydraulic use has been announced by The Tomkins-Johnson Company. The cylinder bodies are honed and then a layer of approximately .001" of hard chrome plating is applied to the inside of the tubing bodies. The result is a very smooth polished surface that will not rust. The moisture from the condensation of compressed air or water, in the case of water hydraulic cylinders, acts as a lubricant in the hard chrome plated bodies, increasing the "slickness" of the surface. This results in less friction, prolonged packing life and appreciably increased cylinder efficiency. The outside diameter of the piston rod is also hard chrome plated to give the same smooth lubricated action at the piston rod packing.

The portions of the bodies and piston rods which are not to be plated are first covered with a lead foil. Suitable fixtures are used for holding the parts while they are plated. Conforming anodes are used. After plating the lead foil is removed.

T-J Non-Rotating Double-Acting Air Cylinders incorporate the use of self-sealing packing which require no adjustment. Seven standard styles in 1½", 2", 2½", 3", 4", 4½", 5", 6", 7", 8", 10", 12" and 14" diameter bores for exerting from 100 to 12,000 pounds are available. T-J Non-Rotating Double-Acting Hydraulic Cylinders in two lines are also available. All tubing bodies for use with air or water up to and including 8" diameter bore and the 10" and 12" diameter cylinders of strokes up to 7" are hard chrome plated.

For further information on T-J hard chrome plated cylinders write The Tomkins-Johnson Company, 630 N. Mechanic Street, Jackson, Michigan.

Send for Valuable Booklet

Composite Die Sections—Rings—Discs Blocks — Shafts — Hubs — Bars and Special Shapes.

▼

Forgings—Billets and Bars of High Speed Carbon and Alloy Tool Steel.

▼

Forgings—Billets and Bars of SAE Specifications—Nitralloy and Stainless Grades.

▼

Copper Forgings

Forgings for all industries.

AJAX STEEL AND FORGE

205 ADAIR STREET DETROIT, MICHIGAN

When you order or write about products described in TDM PROGRESS please mention the publication.

Phoenix Machine Co. Appoints New European Distributor

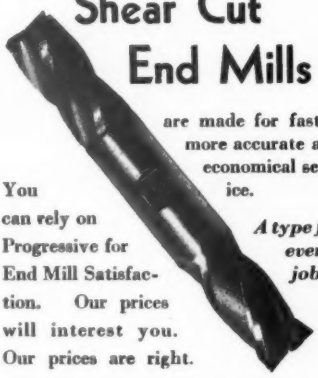
The Phoenix Machine Company, Cleveland, Ohio, manufacturers of Lester Phoenix die casting and plastic injection molding machines, announces the appointment of Dowding & Doll, Limited, Greycoat Street, Westminster, London, England, as European distributors.

In cooperation with Dowding & Doll, a new LP-HHP-1 die casting machine and the recently announced Lester No. 2B six-ounce injection molding machine will be exhibited at the Olympia Exhibition in London from September 14 to 30.

An HHP-3X aluminum die casting machine and one of the late model injection molding machines will be exhibited also at the Machine and Tool Exhibition to be held in the Central Armory in Cleveland, October 4 to 13.

New descriptive circulars of Lester Phoenix equipment are available on request to The Phoenix Machine Company, 2709 Church Avenue, Cleveland, Ohio

PROGRESSIVE
Shear Cut
End Mills



are made for faster, more accurate and economical service.

You can rely on Progressive for End Mill Satisfaction. Our prices will interest you. Our prices are right.

A type for every job.

Ask for catalog and prices

PROGRESSIVE TOOL & CUTTER CO.
Dept. TD
FERNDALE MICHIGAN

The DRIVE-ALL

America's Modern Motorizing Unit

No Countershaft Cone. 4-speed or 3-speed Gear Box. 6 or 8 Speeds with 2-speed Motor. Single Lever Control.

1 H. P. to 5 H. P.

Requires no belt shifting . . . has a built in 4-speed or 3-speed Gear Box, operated by a single control lever.

Is easily applied to machine tools, power presses and production equipment. Greatly increases their efficiency. Eliminates costly overhead shafting. Quickly saves its moderate cost. Fully guaranteed.

Please write us for circular and let us quote on your change-overs

3402 Conner Avenue
Detroit, Michigan

DRIVE-ALL MANUFACTURING COMPANY

When you order or write about products described in TDM PROGRESS please mention the publication.

The Catalog Review

Brief descriptions of current industrial literature including technical booklets and bulletins, catalogs and circulars. All may be had upon request, without charge. . . . Please use identification numbers.

A HALF CENTURY OF EXPERIENCE is behind the standard tools illustrated and described in Gisholt's latest Standard Tool catalog. Embodying new principles of modern turret lathe practice, designed to take full advantage of today's better cutting tools, the extensive line of tools, holding devices, boring bars and reamers are shown with many good set-up illustrations and drawings of applications to a wide range of work on Ram Type Universal Turret Lathes, High Production Turret Lathes and Heavy Duty Turret Lathes.

Multiple cutting tools for heavy and fast feeds to turn two, three or more diameters, tools that combine operations such as turning and boring or drilling; turning, boring and facing, etc., various size and capacity chucks as the Gisholt four-jaw independent, three-jaw scroll and four-jaw combination are shown. Oversize chucks and air indexing fixtures designed for efficiently handling various types of work in conjunction with standard tools and tool holders are included. A new collet chuck which accommodates different sized bar stock through the simple substitution of removable collet pads is a feature.

Gisholt standard tools are easy to set up, many have micrometer screws for easy adjustments to close tolerances. For example, the vertical slide tool has a crank handle and screw with micrometer dial graduated in .001" for quick slide setting. A combination turning, boring and facing tool, compound tool slide and a heavy duty slide tool also have micrometer adjustments.

For a copy of Gisholt Standard Tool Catalog write Gisholt Tool Engineering Division, Gisholt Machine Company, Madison, Wisconsin.

DEMAND FOR INCREASED SPEEDS AND LOADS—without an increase in size of gears has resulted in heat-treated gears that offer advantages in quality and, often, in size and cost as well. The Westinghouse-Nuttall method of treatment, control and quenching is described in outline in a new booklet issued by the Westinghouse Electric & Mfg. Co.

The characteristics and advantages of heat-treated hardened gears, the properties of different materials, heat treatment and case hardening are described and illustrated by tables, charts and reproductions of photomicrographs. Copies of the booklet, "Technical Data 71,000", may be secured from Department 7-N-21, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

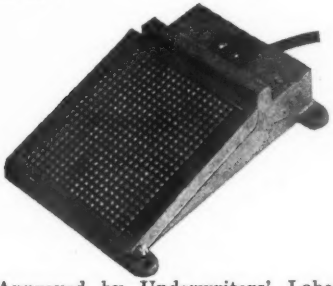
JOHNSON LEDALOYL SERVICE IS EXTENDED.—The new bearing Ledaloyl introduced less than a year ago by Johnson Bronze Company has been accepted so well that the company now is in the position to supply small and other users with over 300 individual sizes from stock. A new catalog giving complete size and price information together with installation data has just been announced. The sizes carried in the company warehouses are labeled "Stock" in the catalog. A number of recognized mill supply distributors also will carry representative stocks. The standard alloy in the sintered bearing runs up to 5% lead, eliminating the harshness of the bronze. Pre-alloying of basic materials gives high quality bearing alloy of uniform strength and uniform lubricating qualities. The Johnson Ledaloyl Bearing Bronze Catalog L-11 will be sent on request. Write Johnson Bronze Co., 312 South Mill Street, New Castle, Pa.

The Walton Company Announces Leeds Foot Control Switch

THE Walton Company, manufacturers of Walton Tap Extractors since 1908, has developed the Leeds Foot Control Switch which is intended to free a machine operator from the necessity of using hand switches. Its use enables the operator to devote his entire attention, both hands and both eyes, to the work and the tool which is being used. Foot pressure assures complete control of the machine at all times and its use is particularly appreciated for quick stops.

The Leeds Foot Control Switch appropriately called "The 3rd Hand" is finding use in tool rooms, die shops and production plants. Installations include drill presses, grinders, rotary files, saws, punches, coil spring winders, photo enlargers and many other unit powered machines.

The "double-break" of the double-pole push switch permits repeated operation without excessive arcing or burned contacts on motors up to and including 1 HP. It can be supplied in a variety of styles to provide current only when pressure is applied to treadle, or conversely, to break the circuit only by pressure upon the treadle. The impulse type switch, which closes the circuit at the first pressure on the treadle and opens it only on a second pressure, is also available.



Approved by Underwriters' Laboratories, the bakelite-enclosed switch is rated—12 amps, at 125 volts, 6 amps, at 250 volts in the 3 standard styles carried in stock, all of which are made to permit intermittent operation with foot control or continuous operation by usual manual control, as desired. Transfer

(Continued on page 44)

DARWIN STEELS

Stand for Quality

We made the *first* HIGH CARBON-HIGH CHROME Steels which were also NON-DEFORMING, opening the way to

Quantity Production

with all kinds of Dies and Press Tools

Oil-Hardening
"NEOR"

Air-Hardening
"COBALTCROM-PRK"
—the latter also in CAST FORM

have become the standard on which all subsequent similar kinds of Steel were based.

We supply also

High Speed Steels

in Bars, Forgings, Tool-Bits as well as all types of

High Grade Tool Steels

Write for descriptive Circulars

WELDING RODS

Save time and money in die repair or tool redesigning as used in Precision-Welding.

Full particulars on request

DARWIN & MILNER, Inc.

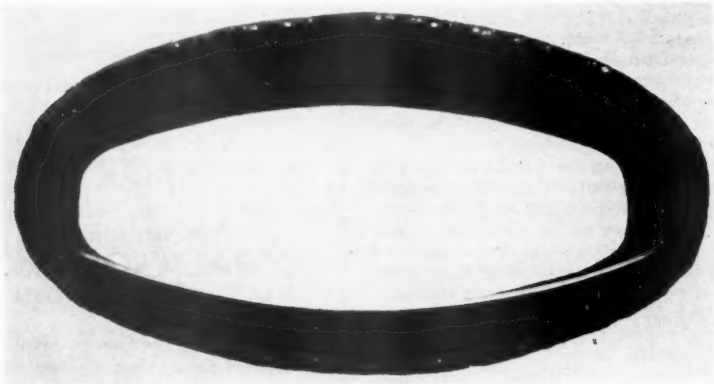
1260-64 W. 4th St. Cleveland, O.

When you order or write about products described in TDM PROGRESS please mention the publication.

Research Establishes Correct Welding Rod Practice for Die Work

RESEARCH conducted recently has developed the fact that the selection of welding rods of the Molybdenum and Tungsten types brings results frequently at great variance with generally accepted ideas. It is because of the intense heat which produces crystal changes in very small steps that great care should be exercised. Dilution of carbon contents of both the deposited and base metals frequently limits the use of air hardening rods.

H. A. Gonser, an authority on the use of arc welding as applied particularly to tools and dies recently completed extensive research into the more efficient use of welding rods for Darwin & Milner, Inc., pioneer manufacturers of high-carbon, high-chromium tool and die steels.



The Meehanite ring on which four welding rods built a permanent cutting edge.

An interesting application of the advanced type of welding was developed recently in the building of a die by The McKinney Tool & Mfg. Company, Cleveland, Ohio. Designed for forming and trimming, the procedure included a temporary cast iron ring (Meehanite) made to form the basis for the outside cutting edge of the die. The usual procedure would then have been to make a permanent steel ring, instead, a step was milled into the Meehanite ring itself, ½" in height and ⅜" in width. At this point a cutting edge was built up by the use of a succession of four welding rods of different analyses. The operation began with a soft metal and ended with the required hard metal coating which provided the actual cutting edge. The process was completed without as much as a pin hole being apparent. This die has been in service for more than a year, has been ground several times and is still turning out entirely satisfactory stampings.

For detailed information and demonstration, write Darwin & Milner, Inc., 1264 W. 4th St., Cleveland, O.

Ford Johansson Gage Business Far Ahead in 1939

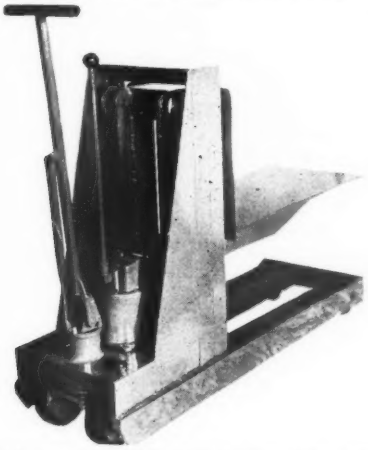
Johansson gages form the basis for most of the precision manufacturing carried on in the United States.

Measured by dollar volume May sales of Johansson gages by Ford Motor Company was two and one-half times the monthly average according to information obtained at the home offices of the company. The month's volume was the best since April, 1930, it was said. Sales for the year to date are more than 25 per cent better than last year.

Lyon Truck Has Hydraulic Elevating Table

A shop type truck with hydraulic elevating table developed by the Lyon Iron Works has, with modifications in design, found many uses. Some of these uses are handling sheet metal for feeding various types of machines, such as shears, presses or punches, so that the operator has the sheets at a convenient height for feeding into these machines.

Other uses are for handling heavy rolls in and out of rolling machines and also for handling dies in and out of presses. The truck shown in the illustration was designed for this purpose



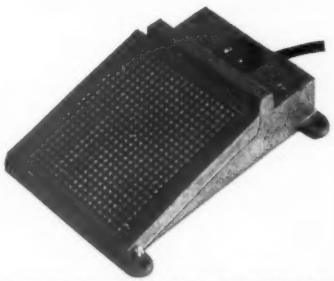
and was of 4,000 pound capacity. On this model a winch is mounted on the front end of the table and elevates with it. This winch is used for pulling the rolls and the dies on the table.

The table on this truck is 24" wide by 48" long, has a lowered height of 20" and may be elevated hydraulically to a height of 43". Numerous other sizes of table top have been furnished as well as a variety of lowered and elevated heights and capacities.

The elevation of the table is through means of lever arrangement and hydraulic rams.

The Lyon Truck with Hydraulic Elevating Table is manufactured by Lyon Iron Works, Greene, N. Y., who will be glad to send complete descriptive and price information.

"THE 3RD HAND"



LEEDS FOOT SWITCH
For Motor-Driven Tools.
Safe, Convenient, Inexpensive.
Write for Folder 231
THE WALTON CO.
88 ALLYN ST. HARTFORD, CONN.

ALLOY HY-TEN STEELS
Immediate Shipment from Six Warehouses
ALLOY S. A. E. STEELS

Reduce your tool and die costs with *Hy-ten "M" Temper, .70 Carbon Cr-Ni-Moly* oil hardening alloy steel. Extreme toughness at high degrees of hardness. Rounds, squares and flats in stock. Forgings of all types.

Send for descriptive folder

WHEELOCK, LOVEJOY & CO., INC.
CAMBRIDGE CLEVELAND CHICAGO NEWARK DETROIT BUFFALO

When you order or write about products described in TDM PROGRESS please mention the publication.

Tool · Die · Machine CONTRACT SHOPS

Among these shops will be found modern facilities for building every kind of Special Tool, Die and Machine. Some are equipped for small and medium size work, others for large. Some do Designing and Engineering, Development and Experimental Work and build Models; others are equipped for production of Precision Specialties of every description. Still others operate Machine Production plants and manufacture Parts, Stampings and Complete Assemblies. All will appreciate the opportunity to submit estimates.

Detroit, Michigan

DAVIS TOOL & ENGINEERING COMPANY
6481 Epworth Blvd. TYler 46070
TOOLS and DIES
Special Machinery
Sheet Metal
Stampings and Assemblies

ENTERPRISE MACHINE PARTS CORP.
Jerome Ave. at McNichols Rd. E. TOwnsend 8-9643
PRODUCTION MACHINE REPAIR PARTS
Motor Drives, Gears, Worms, Tools, Fixtures
Machine Overhaul Specialists

***KOESTLIN TOOL & DIE CORPORATION**
3605 Humboldt Ave. Detroit, Mich.
Manufacturers
Sheet Metal Dies "Grindrite" Die Grinders

LINCOLN TOOL & DIE COMPANY
950 West Fort Street CHerry 0733
TOOLS—DIES—JIGS—FIXTURES
Special Machinery *Precision Grinding*

MAJESTIC TOOL & MFG. COMPANY
2948 Woodbridge St., East FItzroy 1011
Manufacturers
General line of Tool and Die Work, Tool Details, Parker High Speed Grinding Spindles

NORTHEASTERN ENGINEERING CO.
3125 E. Larned St. FItzroy 1275
Specialists in the Designing and Building of Progressive Dies
Dies—Tools—Special Machinery

ROBBINS ENGINEERING COMPANY
637 Mt. Elliott Ave. FItzroy 4740
Designers and Manufacturers
Tools, Dies, Jigs, Fixtures
Special Machinery and Experimental Work

ROYAL OAK TOOL & MACHINE CO.
621 E. Fourth St., Royal Oak, Mich. ELmhurst 6580
Manufacturers of
Tools, Dies, Jigs, Fixtures. Special Machinery and Designing. Hoch Self-Centering Cylinder Reamers

STAR TOOL & DIE WORKS
2522-24th St. LAfayette 1716
BUILDERS of DIES
Facilities for the Largest
MANUFACTURERS
of STAMPINGS

Cleveland, Ohio

BARTH STAMPING & MACH. WORKS
W. 34 & DENISON SHa. 1857
DIES—TOOLS—JIGS—MOLDS
GLENN A. BARTH THOM. A. BARTH
J. A. BARTH J. J. BARTH

***THE BUNELL MACHINE & TOOL CO.**
1620 East 24th St. PRospect 2681
JIGS—FIXTURES—GAGES—MODELS
Blanking, Forming, Drawing, Piercing
Trimming, Bending and Coining Dies
Special Tools and Machinery

CLEVELAND UNIVERSAL JIG COMPANY
13404 St. Clair Ave. MUlberry 3322
Designers and Builders
Jigs & Fixtures Special Machines
Production Engineering
COMPLETE PLANT
ROUTING and TOOLING

***See larger display advertisement also.**

When you order or write about products described in TDM PROGRESS please mention the publication.

THE DENNING MANUFACTURING COMPANY
1775-81 East 87th St. CEdar 0801
Designers and Builders
HIGH GRADE DIES

HAHN MANUFACTURING COMPANY
5332 Hamilton Ave. ENdicott 2205
Modern equipped shop for building of
MEDIUM AND LARGE
DIES, TOOLS, SPECIAL MACHINERY
Equipment includes:
3" and 5" spindle Horizontal Boring Mills
Large planers Vertical Mill

THE INDUSTRIAL MACHINE CO.
1436 East 47th Street Founded in 1903
Builders of Special Machinery
GENERAL MACHINE WORK

KIFFER TOOL & DIE CO.
5601 Tillman Ave. WOodbine 2440-2441
Manufacturers Special Machinery
Tools, Dies, Jigs, Fixtures, Tungsten Carbide Tools
SWISS JIG BORING

THE McKINNEY TOOL & MFG. CO.
1688 Arabella Rd. KEnmore 1681
Roller Die Forming Machines
Automatic Saw and Shear Cut-off Machines
Special Machinery—Dies, Jigs, and Fixtures
Jig Boring—Precision Machine Parts

MODERN TOOL & DIE CO.
P. O. Box 2741
West Park Branch CLearwater 6410
DESIGNERS AND BUILDERS
Tools and Dies *Special Machinery*
STAMPINGS

OHIO TOOL COMPANY
3160 West 106th St. CLearwater 3200
Designers and Builders
SHEET METAL DIES, TOOLS, SPECIAL MACHINERY, DIE CASTING DIES
RUBBER MOULDS
●
Modern Facilities
150-Man Shop

THE PARAMOUNT TOOL CO.
1392-98 East 43rd St. ENdicott 2220
JIGS, FIXTURES, DIES
Experimental Work

The PHOENIX MACHINE COMPANY
2711 Church Ave. CHerry 1048
GRINDERS
12" by 100" Cylinder
16" by 36" Surface
Let us figure

A. P. SCHRANER & COMPANY
3338 Payne Ave. HEnderson 8644
EXTERNAL CYLINDRICAL
LAPPING MACHINES
Special Machinery
TOOLS, DIES, JIGS, FIXTURES

***THE SOMMER & ADAMS CO.**
18511 Euclid Ave. KEnmore 0810-0811
DESIGNERS AND BUILDERS
Special Machinery
TOOLS, JIGS and FIXTURES

STAR MACHINE & TOOL COMPANY
9320 Woodland Ave. GArfield 2060
Designers and Builders
Dies, Jigs, Fixtures, Gages, Special Machinery
Jig Boring—Planer Equipment

TOOLS & GAGES, Inc.
3106 East 63d St. MIchigan 7230
"Let us be your tool room."
DESIGNERS AND BUILDERS
Tools, Gages, Dies, Jigs, Fixtures
Special Machinery
SWISS JIG BORING
DIE CASTING DIES

THE J. C. ULMER COMPANY
1791 East 38th St. HEnderson 4601
Tools, Dies, Jigs, Fixtures
Special Machinery *Designing and Building*
Experimental, Model, Punch Press and
Screw Machine Work

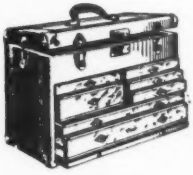
THE VARIETY MACHINE & STAMPING COMPANY
12698 Elmwood Ave. LAkewood 8433
Designers and Manufacturers
Dies, Metal Stampings 250 tons capacity

Hamilton, Ohio

***THE HAMILTON TOOL COMPANY**
220-222 North B Street
Designers and Builders of
Tools, Dies, Jigs, Fixtures, Special Machinery
The Hamilton Portable Elevating Table

*See larger display advertisement also.

When you order or write about products described in TDM PROGRESS please mention the publication.

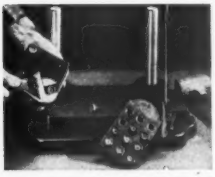


CARING FOR TOOLS *Pays!*

Systematic Care of tools pays the employer in increased production. The men will do more work and do it more easily when they care for their tools in a *Gerstner* Chest. The choice of particular men for 30 years. *Free Catalog.*

GERSTNER TOOL CHESTS
56 Columbia St., Dayton, Ohio

NIELSEN TRANSFER SCREWS
Locate drill holes perfectly and quickly



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time of other methods and eliminate spoilage.

7 Sizes · Inexpensive · Last for years · *Write for circular*

NIELSEN TOOL & DIE COMPANY
1859 Gardner Avenue Berkley, Michigan

ARLAVOX *heavy duty*
De-Magnetizer

Years of built-in low cost service... A necessity in Tool Room and Die Shops.

Send for circular

ARLAVOX MFG. COMPANY
428 South Green Street
Chicago Illinois

N.A. Woodworth Company Formed

N. A. Woodworth, formerly president of Ex-Cell-O Corporation, has re-entered the tool and machine field by organizing the N. A. Woodworth Company which has acquired the plant and facilities of the Partool Machine Company, 9111 Schaefer Highway, Detroit, Michigan. Associated with him are E. W. LaMonte, former vice president of Swartz Tool Products Company, and J. F. Benner of the Partool Machine Company. Activities will at first be confined to precision tool and machine work.

Walton Announces Leeds Switch

(Continued from page 39)

from one machine to another may be accomplished in less than a minute.

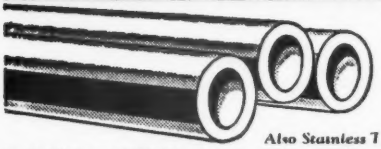
The Walton Company, 88 Allyn Street, Hartford, Connecticut, have prepared a circular which describes the Leeds Foot Control Switch. Copy of it and prices may be had upon application. Please mention TDM PROGRESS.

Recessed Head Screws End Screw-Driving Troubles

The patented Phillips Recessed Head Screws, with tapered recess for precision contact of driver point, is a product of the American Screw Company. Because the fit is so accurate, the screw clings to the driver in any position—driving is always in a straight line, awkward positions do not slow up the work or multiply accidents. Widely used in the production industries, Phillips Recessed Head Screws offer the tool rooms and die shnps a full line of machine and sheet metal assemblies.

For literature, prices and nearest distributor of Phillips Recessed Head Screws, write American Screw Company, Providence, Rhode Island.

OIL HARDENING TOOL STEEL TUBING



Substantially reduces labor costs by eliminating the expensive procedure of drilling from the solid.
BISCO TOOL STEEL TUBING is a fine grade tool steel in tubular form available in sizes up to 14" diameter and 2" wall thickness; other sizes to your specification.

THE BISSETT STEEL COMPANY
947 E 67th St, Cleveland, Ohio

Also Stainless Tubes, Mechanical Tubes, Aircraft Tubes, Pressure Tubes

C. O. Watkins, 11955 Princeton Ave., Chicago, Ill. Victor Brook, 433 Rockingham St., Rochester, N. Y.

When you order or write about products described in TDM PROGRESS please mention the publication.

Die Designing and Estimating

(Continued from page 18)

is the type most frequently specified by the designer and used by the die maker.

We have now at hand the tables of time values and die parts drawings necessary for computing the time required for completely finishing each of the group E accessories and operations.

Space this month does not permit description of the method of application. This will be done in September but in the meantime it should be possible for many readers to make use of this data by way of practice. Next month we shall apply the principles laid down, to our own specimen die.

Hardness Testing of Steels

(Continued from page 21)

made 100% production testing to specifications practical because it includes the following characteristics: (1) simplicity and accuracy in the hands of an average operator; (2) speed and capacity for production testing; (3) adaptability to a wide range of shapes and sizes; (4) consistency of each machine and uniformity of results with similar machines; (5) independence of results to character of surface finish and (6) it employs no microscopes or pressure gages.

For a brief résumé of the Rockwell Hardness Tester's advantages and specifications ask for leaflet RM-8, or a copy of Catalog 21 with the complete background of the testing method will be sent on request. Write Wilson Mechanical Instrument Co., Inc., 385 Concord Ave., New York, N. Y.

A Special Invitation
to Tool and Die Shop Men

To those shop executives who have charge of the design, construction, use and maintenance of tools, dies, molds, jigs, fixtures and gages, I would like to issue a sincere and pressing invitation to the Machine Tool Show. We realize how important in mass production is the work of the Tool Room—in every way the very heart of any shop—and the Contract Tool and Die Shop. They need simple, flexible machines, easily changed from one job to another, yet offering for a wide range of jobs the speeds and feeds required.

You will find as you visit the Machine Tool Show that this great need has not been forgotten and that our designers and engineers have much to offer the men who are primarily concerned with building tools and dies and manufacturing to close limits of accuracy, be the quantities large or small.

Mass production is a distinctly American development and we are proud of the service it has rendered to the world. We are naturally proud of the part Machine Tools have played in this field, but the Tool Room of the future and its cooperating unit, the Contract Tool and Die Shop, also will be well represented in the Machine Tool Show of 1939.

Wendell E. Whipp
President, National Machine Tool Builders' Association,
President, The Monarch Machine Tool Company

One Man and a "Portelvator"

No shop is completely equipped without it.

Lift and move 2000 to 5000 pound dies, jigs and fixtures easily and safely. This **Hamilton Portable Table** quickly overcomes its cost by eliminating costly mishaps and breakage and in actual time saved.

Write for circular and prices

THE HAMILTON TOOL COMPANY

220-248 North B Street Hamilton, Ohio

When you order or write about products described in TDM PROGRESS please mention the publication.

DE-STA-CO ARBOR SPACERS

They save time in setting up cutters on milling machines and other tools. Will help you get work out quicker. Low in cost, but high in savings. Standard stock sizes from .001" to .125" thick. Also specials up to 4.000".

TRIAL ASSORTMENT

Enough spacers for average use on one machine, sent for $1.00. Give arbor size when ordering.

Price list No. 70 sent free

DETROIT STAMPING CO.
3443 Fort St., West Detroit, Mich.

H. O. BATES
TOUGH

STEEL LETTERS & FIGURES, NUMBERING MACHINES, MARKING MACHINES, STAMPS & DIES

. . .

MARKING PROBLEMS INVITED

. . .

SEND FOR LATEST CATALOG

H. O. BATES, MARKING DEVICES
251-257 North Broad Street
ELIZABETH, N. J.

An Indexing Fixture for Milling Parallel Oil Grooves

(Continued from page 27)

Other applications for this type mechanism have been adopted in drilling and tapping fixtures and other milling applications where cuts are light and the machine rigid enough to permit the use of a cam for clamping.

Ronald Updike, Chief Tool Designer, Schwitzer-Cummins Company, Indianapolis, Indiana.

Motorizing Pays Dividends

(Continued from page 35)

portant factor and belt shifting should be eliminated to as great an extent as possible.

The new Drive-All Motorizing Unit solves this problem with a built-in 4-speed or 3-speed transmission. The single speed shift lever gives the operator his choice of three or four speeds. With a 2-speed motor, six or eight speeds are available. Drive-All units are compact, sturdy and efficient and are easily applied to all modern machine tools, power presses and production machinery. They will drive machines requiring from one to five horsepower and the motor rails are adjustable to accommodate any size motor. The support and motor rails are sturdy and rigid and easy adjustments are available for belt tension. Belts may be guarded. Transmission gears are husky and rotating parts are mounted on ball bearings for quiet, frictionless operation. An oil bath provides proper gear lubrication

A new circular has been prepared and may be had by writing the Drive-All Manufacturing Co., 3402 Conner Avenue, Detroit, Michigan. Please mention TDM PROGRESS.

When you are trying to make time in tool room or die shop don't take a chance on heat treating. Use the Sal-Way Salt Bath for assured accuracy and uniformity.

Write for full information.

SAL-WAY—A National Steel Treating Service

SAL-WAY
Steel Treating Inc.
624 W. Elizabeth St.
Detroit - - Michigan

Only commercial heat treater using electrically heated and controlled Salt-Bath Method exclusively.

When you order or write about products described in TDM PROGRESS please mention the publication.

Here's How We Look at it When We Design and Build A Jig or Fixture . . .

That jig or fixture represents to us the opportunity to solve a production problem. We analyze it carefully and develop the solution painstakingly. We are rendering an engineering service, not just manufacturing something.

We have proven time and again that our long experience qualifies us to build a perfectly functioning piece of equipment.

We use the best materials and accessories that we can buy. We machine the parts accurately, harden and grind them to fit perfectly.

We render this service economically and we ask only the opportunity to submit estimates on your requirements.

Please send us your prints.

We are builders of the highly efficient S & A Automatic Machines for Continuous Milling, Drilling and Polishing

THE SOMMER & ADAMS COMPANY

18511 Euclid Avenue — Cleveland, Ohio

Representatives

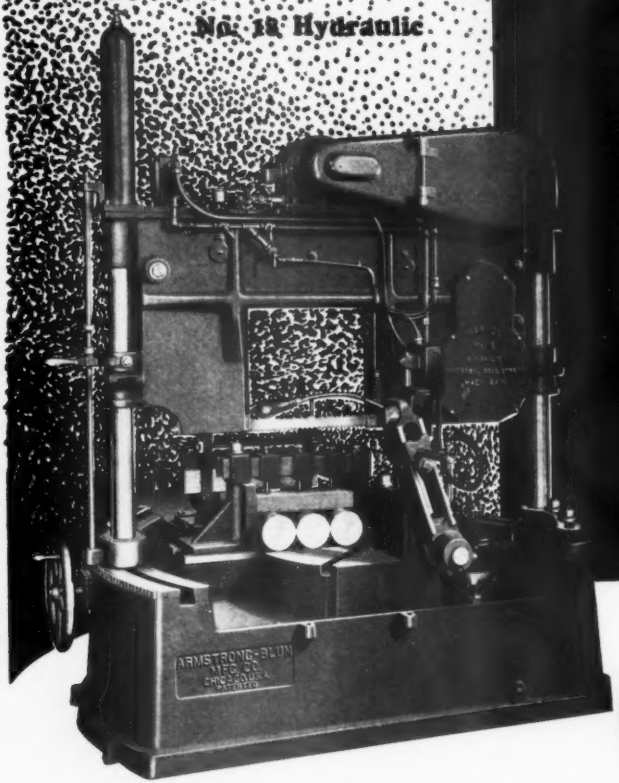
JOHN E. LIVINGSTONE & CO.
2921 E. Grand Blvd., Detroit and Windsor, Ont.

P. W. FRANKFURTER
4623 Morris Street
Philadelphia

NEFF-KOHLBUSH & BISSELL
2257 W. Madison Street
Chicago

MARVEL
SAW

No. 18 Hydraulic



MARVEL

ARMSTRONG - BLUM MFG. CO.

"The Hack Saw People"

5757 Bloomingdale Ave. CHICAGO, U. S. A.